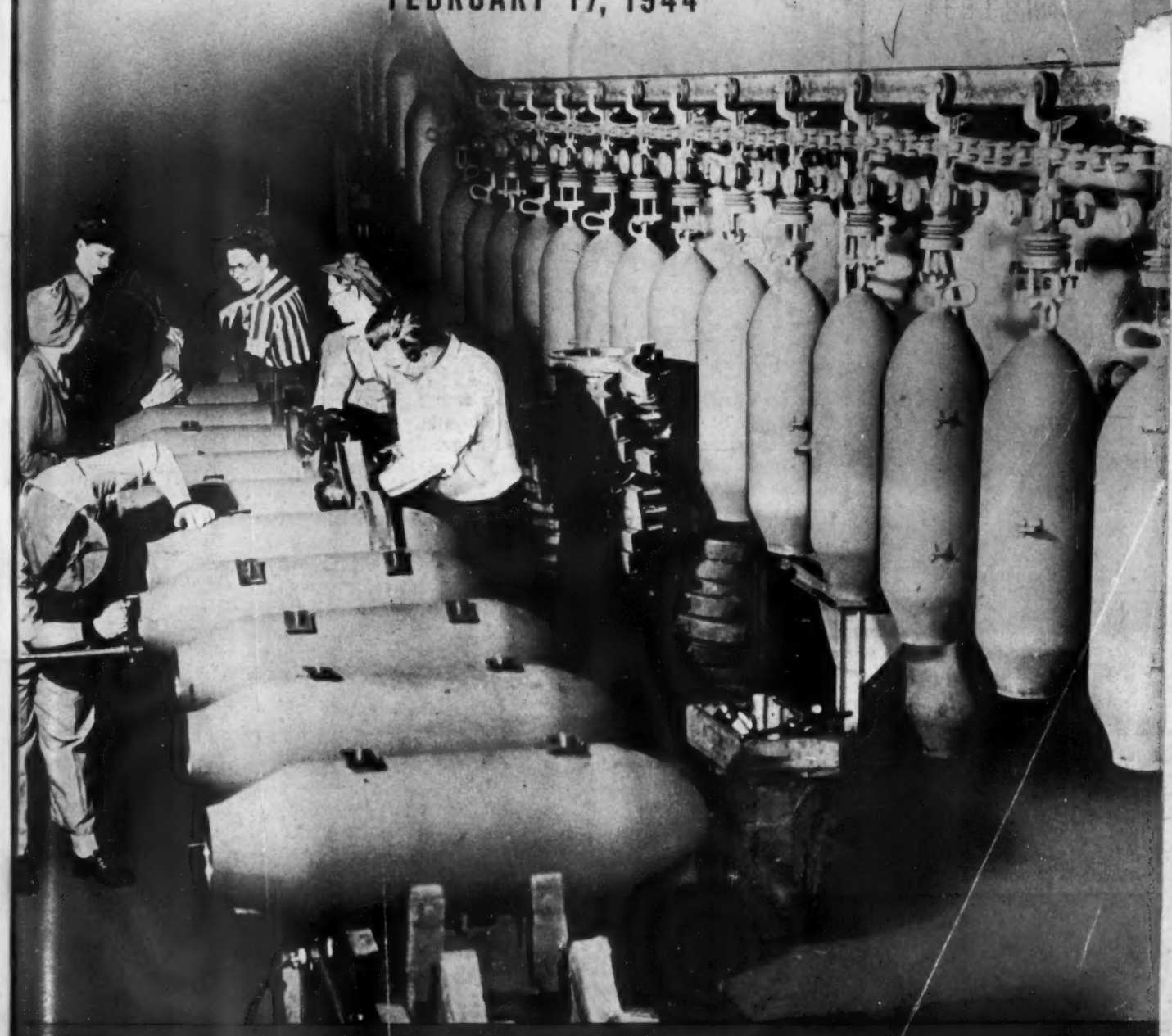
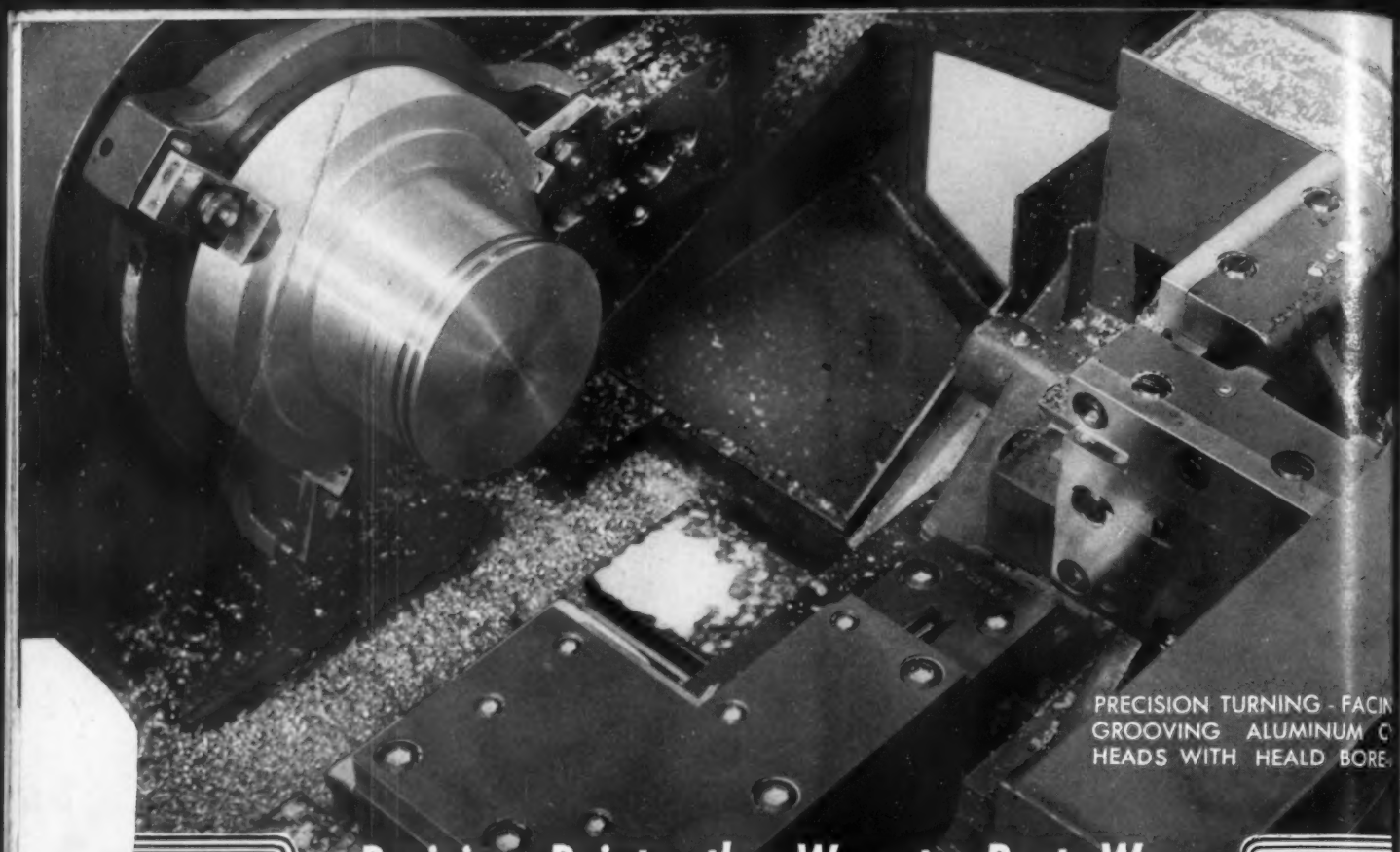
TECHNOLOGY DEPT.

AMERICAN MACHINIST

FEBRUARY 17, 1944



Bomb Manufacture Speeded by Mechanical Handling—Page 105



Borizing Points the Way to Post War Precision Finishing of Light Metals

ALUMINUM

MAGNESIUM

AIRCRAFT PARTS

★

Adapter Assemblies
Bases
Bearing and Pump Casings
Bearing Housings
Bearing Supports
Boost Control Housings
Camshaft Brackets
Camshaft Housings
Caps
Carburetor Bodies
Carburetor Main Bodies
Clutch Selector Housings
Covers
Cylinders
Cylinder Heads
Cylinder Muffs
Crankcase Assemblies
Crankcase Sections
Crankcase Blower Sections
Crankcase Front Sections
Crankcase Center Sections
Crankcase Covers
Crankcase Rear Covers
Intermediate Crankcases
Intermediate Rear Crankcases
Lower Half Crankcases
Rear Crankcases
Crankcase Bearing Caps
Crankpin Oil Plugs
Crankshaft Oil Plugs
Drive Shaft Supports
Front Bearing Caps
Front Covers
Fuel Pump Bodies
Fuel Pump Drive Shafts
Gear Boxes
Gear Cases

What can be accomplished with light metals such as aluminum and magnesium, and indicative of what will be done with these alloys in post-war manufacturing, has already been shown by the aircraft industry. Approximately 40 per cent of the aircraft engine is comprised of light metals, and largely because of this it has been possible to reduce the horsepower-weight ratio to 1 lb. per horsepower.

Just as valuable as the aircraft industry's lesson to the post-war world on the use of light metals are the lessons to be learned from their methods and practices in machining aluminum and magnesium. Their methods of finishing parts made of these metals deserves particular attention. Study of their processes reveals the outstanding fact that *borizing*, or precision boring, turning facing, and grooving with cemented carbide or diamond tools, is used almost exclusively for precision finishing of aluminum and magnesium. The partial list of aircraft parts given herewith is eloquent testimony of this —all of them are made of either aluminum or magnesium and all of them are *borized*.

For More Precision, FASTER

bring your problems to

The HEALD MACHINE CO., Worcester, Mass.

Generator End Sh
Gun Turret Gimb
Gun Turret Saddl
Gyro Pilot Pump
Gyro Pilot Servo
Housings
Hydraulic Cylinde
Instrument End S
Magneto Adapter
Magneto Gear Hu
Magneto Housing
Motor End Shield
Oil Pumps
Oil Pump Bodies
Oil Pump Covers
Oil Pump Scaven
Pistons
Plates
Pump Housings
Propeller Domes
Propeller Shaft Bu
Propeller Shaft Pi
Rear Cam Suppor
Rear Reduction G
Reduction Drive S
Reduction Gear C
Regulator Covers
Regulator Housin
Selsyn Motor Par
Shock Absorber F
Speed Reducer H
Supercharger Bea
Supercharger Fro
Supercharger Gea
Supercharger Rea
Supercharger Rea
Valve Brackets
Valve Housings
Valve Guides
Valve Tappet Gui
Volute Casings
Water Pump Cas
Wheelcases

American Machinist

February 17, 1944

BURNHAM FINNEY	Editor and Publisher
W. E. KENNEDY	General Manager
JOHN HAYDOCK	Managing Editor
WILLIAM J. HARGEST	Associate Editor
RUPERT LE GRAND	Associate Editor
BEN C. BROSHEER	Associate Editor
E. J. STRICKLAND	Pacific Coast Editor
MILTON H. GLOVER	Art Director
LAURANCE C. MESSICK	News Editor
THEODORE C. DU MOND	Assistant Editor
E. C. HAINES	Assistant Editor
PAUL WOOTON	Chief, Washington Bureau
BENJAMIN W. CORRADO	Washington
FRED H. COLVIN	Editor Emeritus
KENNETH H. CONDIT	Consulting Editor

District Managers: F. S. Weatherby, Boston; J. A. McGraw, New York; B. M. Hilberts, Philadelphia; Ray Deen, Chicago; P. F. Pritchard, Chicago; John Koch, Cleveland; R. H. Anderson, Cincinnati; T. A. Rogers, Detroit.

McGraw-Hill Publishing Company, Inc.

James H. McGraw, Founder and Honorary Chairman; James H. McGraw, Jr., President; Howard Ehrlich, Executive Vice President; Mason Britton, Vice President; Curtis W. McGraw, Vice President and Treasurer; Joseph A. Gerardi, Secretary; J. E. Blackburn, Jr., Director of Circulation, 330 West 42nd Street, New York 18, N. Y. Branch offices: Chicago, 520 North Michigan Ave.; San Francisco, 68 Post Street; Los Angeles, 601 W. Fifth Street; Aldwych House, Aldwych, London, W. C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta.

RETURN POSTAGE GUARANTEED

VOLUME 88 NUMBER 4

AMERICAN MACHINIST. Copyright 1944 by McGraw-Hill Publishing Co., Inc. Published every other Thursday, price 35c a copy. Allow ten days for change of address. Subscription rates—United States, Mexico and Central and South American countries, $5 a year, $8 for two years, $10 for three years. Canada, $5.50 a year, $9 for two years, $11 for three years. All other countries $8 a year, $13 for two years, $16 for three years. Entered as second class matter, August 13, 1943, at Post Office, New York, N. Y., under the act of March 3, 1879. Printed in U.S.A. Cable address, "McGraw-Hill, New York." Member of A.B.P. Member of A.B.C.

A McGRAW-HILL PUBLICATION

PRINTED IN U. S. A.

MAJOR ARTICLES

Chevrolet Develops Low-Cost Cutter 83
War Industries Alter South Africa's Economy ..... *B. W. Corrado* 88
Railroad Repairs Switches by Welding ..... *Arthur Havens* 91
Bedding-in Lathe Carriages by Power 93
Shop Shots From an Aircraft Engine Plant 94
Fixture Speeds Knurling of 37-mm. A. P. Shot 96
Free Enterprise—Incentives and Taxation ..... Facing page 96
To Heat-Treat In or Out? ..... *A. S. Eves* 97

ARMAMENT SECTION

Bomb Manufacture Speeded ..... *W. V. Casgrain & L. J. Bishop* 105

SHORT ARTICLES

Bits Regarding Personnel ..... *Fred H. Colvin* 144

PRACTICAL IDEAS

Dividing Head Speeds Machining of Castle Nuts ..... *C. A. Kothe* 99
Assembly Fixture Holds Gears in Alignment ..... *Alex George* 99
Continuous Lubrication for Loose Pulleys ..... *Martin H. Ball* 100
Burrs Removed Automatically From Screws ..... *Clyde Brinser* 100
Redesigned Gage Blocks Save Steel ..... *Joseph Kautsky* 101
Painting Rack Eliminates Masking ..... *Zeno Ivery* 102
Portable Tool Speeds Locomotive Repairs ..... *L. W. Sagle* 102
Circular Tool Removes Burrs From Cylinders ..... *Earl J. Breeding* 103
Lift Truck Attachments Simplify Handling ..... *Daniel Ippolitto* 103
Bell Cap Center Punch Insures Accurate Drilling ..... *J. Phillips* 104
Tool Devised for Airloc Fasteners ..... *Gilmore Peers* 104

NEWS OF THE INDUSTRY

Gaging Business 120b
Inside Detroit 120e
Wartime Washington 120g
Spotting the Air News 120i
Names in the News 120k
Obituaries 120l

DEPARTMENTS

What's in This Issue 81
Reference Book Sheet 117
Editorial 120a
Shop Equipment News 121
Parts and Materials 132
Trade Publications 138
New Books 142
Sixty Years Ago 143

CHANGE OF ADDRESS

McGRAW-HILL PUBLISHING COMPANY, 330 West 42 Street, New York 18, N. Y.
Director of Circulation: Please change my address on American Machinist

From _____

_____

To _____

_____

Signed _____

AMERICAN MACHINIST —chips

Worn Out "Tools" . . . Counting up the other day we found that reprint distribution of the special sections "The Tools of Our Trade" has swung past the 90,000 mark and is still going.

For late comers among *American Machinist* readers, we might say that the 5 booklets comprising this training series are:

The Tools of Our Trade
How To Run a Drilling Machine
How To Run a Milling Machine
How To Run an Engine Lathe
How To Run a Grinding Machine

Since the first section appeared in *American Machinist* almost a year ago, it occurs to us that some of the early askers for reprints probably have used up their supply, and no doubt many copies have been torn, oil-soaked or lost.

Should you require new reprints to replace shop-worn ones or for distribution among new employees, they are available at the usual tax of one thin dime per.

o

Manpower Source . . . Of the 51,490 handicapped workers hired the first 9 months of 1943, only 23,336 were classified as "unskilled."

o

Inventions . . . Continuing our reporting of "The 19 Basic U. S. Inventions"—the series of articles being run in Allis-Chalmers *Electrical Review*—we come to the third group, "Communication Equipment."

These key products were Morse's telegraph, 1840; Bell's telephone, 1876; DeForest's amplifying tube, 1908; Sholes' typewriter, 1868; Mergenthaler's linotype, 1890. All of them products made in Metal-Working plants.

Interestingly enough, the simple electrical inventions—telegraph, telephone and vacuum tube—required the efforts of college-trained men. The complicated linotype and typewriter were invented by practical, mechanical men.

o

Fulton on His Inventions . . . The *American Machinist* of Feb. 28, 1885, commented as follows: "It is curious how an author will sometimes overestimate one of his works which a discriminating public declares to be mediocre, while the same writer will *under*estimate another work that the world declares to be his best. The steamboat invention revolutionized the methods of navigation all over the world, yet Fulton regards that invention as unimportant compared to his torpedo system, which the world then declared to be impracticable.

"In a letter written by Robert Fulton in 1807 to an intimate friend he says '. . . However useful this (steamboat) may be, it is not half so important as the torpedo system of defense and attack—an object of infinite importance to the welfare of America and every civilized country. But thousands of witnesses have now seen the steamboat in rapid movement, and they believe; they have not seen a ship-of-war destroyed by a torpedo, and they will not believe.

'We cannot expect people in general will have a knowledge of physics, or power of mind sufficient to combine ideas and reason from causes to effects, but in case we have war, and the enemy's ships come into our waters, if the Government will give me reasonable means of action, I will soon convince the world that we have surer and cheaper modes of defense than they are aware of!' "

You said it, Mr. Fulton!

o

Practical Ideas . . . For a long time one of the most looked-for and appreciated departments in this Metal-Working journal has been "Ideas From Practical Men." More recently, similar material has been presented under the heading "War Winning Suggestions." Over and over again readers have commented on the value of such editorial material in their daily work.

You probably noticed that starting with our February 3rd issue these two departments were combined under the heading "Practical Ideas . . . from Practical Men." This seemed to be a logical wedding and we hope the union will be blessed with many new and helpful ideas.

We would very much like to have your comments on the combined set-up.

o

Hitting Bottom . . . A friend of ours recently was asked his opinion of a certain job applicant who had been highly recommended as to personality and ability. The description of this man's shortcomings was given in vivid—yes, we might even say "dizzy"—language, and ended up: "As to his draft classification, it should be 5X, which means 'to be evacuated in case of invasion'."

Second Call . . . We thought we'd better comment once more on the fact that *American Machinist's* 31st Annual Review Number did not carry the usual "Where-to-Buy" Directory—a section listing manufacturers of Metal-Working equipment, tools, accessories, materials and supplies. However, this Directory has been printed as a separate booklet and will be sent free upon request to any reader desiring it. Every effort has been made to revise the Directory carefully and provide an accurate source for Metal-Working equipment and supplies. If you want this buying guide and have not already sent for it, fill out and mail the coupon below.

AMERICAN MACHINIST
330 West 42d St., New York 18, N. Y.

Please send me at no charge a copy of the 1944 "Where-to-Buy Directory."

NAME .....

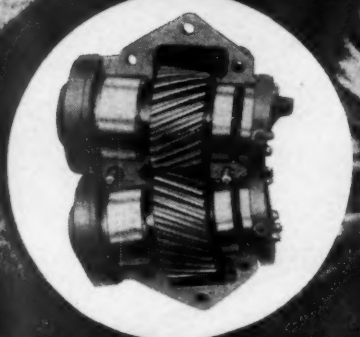
POSITION .....

FIRM .....

ADDRESS .....

.....

BEVEL GEAR DRIVES — TO *Victory*



Gleason-cut angular spiral bevel gears . . . for PT boat V-drives.

SCOURGE OF AXIS SHIPPING

The U. S. Navy's little PT boats have inscribed in the pages of history some of the most dazzling exploits of the war. Whether in the Solomons or along the coast of Italy, these hard-hitting PT's have sent to the bottom the enemy's mightiest cruisers, destroyers, transports.

Through the pounding of heavy seas and against terrific shell fire, these dauntless craft and their indomitable crews have successfully harassed the Axis with their ability to dash in quickly upon an unsuspecting enemy vessel, fire their deadly torpedoes and then get away.

ANGULAR SPIRAL BEVEL GEARS PROVIDE SMOOTH, DURABLE "PT" POWER TRANSMISSION

The bewildering speed, hair-breadth starts and abrupt turns required by these "hit and run" tactics demand a dependable flow of power from the PT's rugged engines to their propellers. Angular Spiral Bevel Gears supply the answer, "taking" the great speeds and sudden, high loads with smoothness and uniformity. Moreover, the use of these angulars permits mounting the motors in the stern of these boats with the most effective distribution of weight and utilization of space. This type of drive arrangement is known as a "V-drive."

CUT ON GLEASON MACHINES

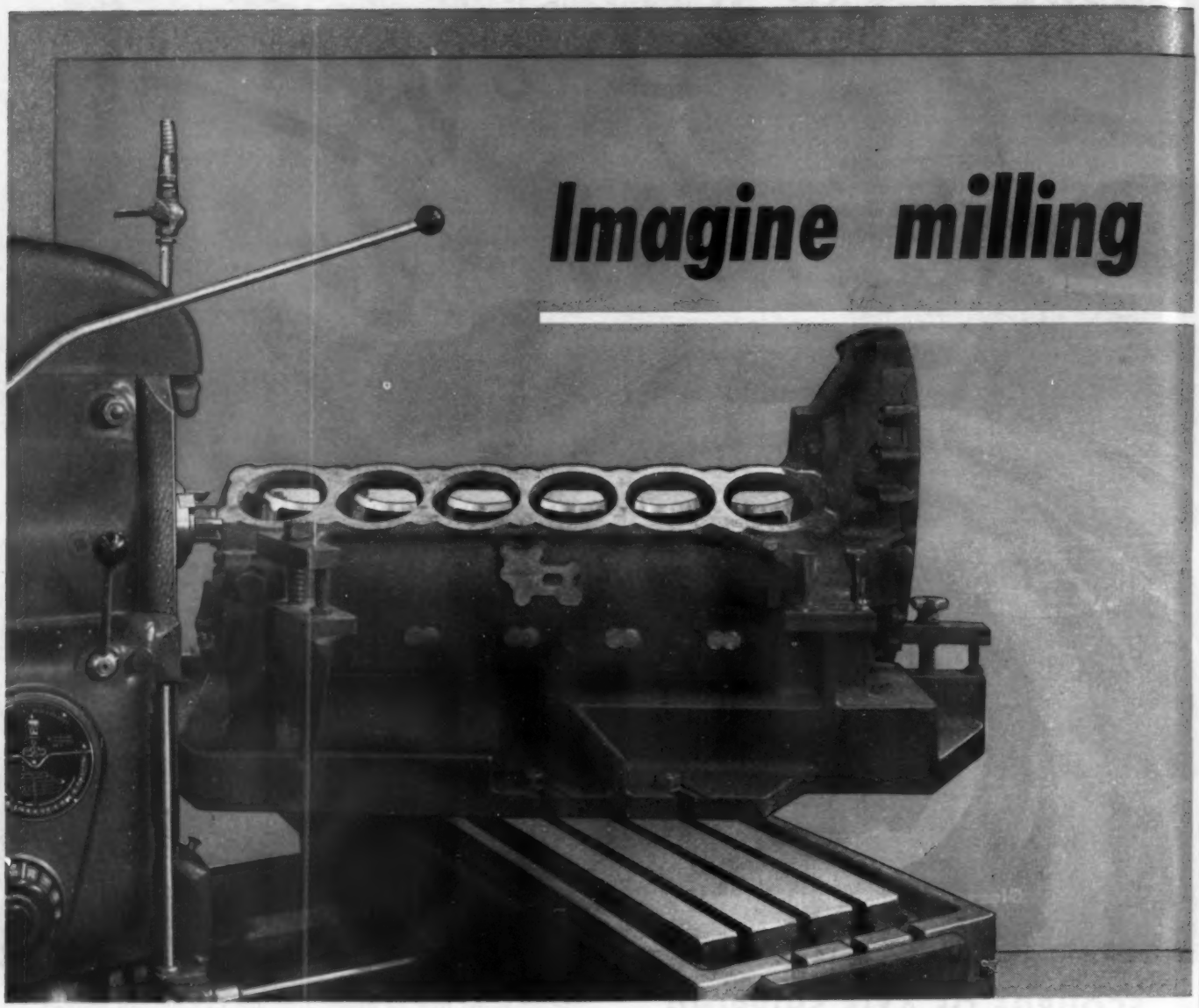
These Angular Spiral Bevels are cut with great accuracy and speed of output on Gleason Spiral Bevel Gear Generators.

This is just one of many examples of the adaptability of bevel gears in transmitting power smoothly and durably no matter what the angle. This war-proven capability of angular bevel gears points the way to new types of power transmission for the world of tomorrow.

GLEASON WORKS

Builders of Bevel Gear Machinery for Over Seventy-five Years

1000 UNIVERSITY AVENUE, ROCHESTER 3, N. Y., U. S. A.



Imagine milling

Handling this job on a machine without complete rear controls would be tantamount to blindfolding the operator and expecting him to turn out good work. But by putting it on a CINCINNATI Dial Type, you know it has far more chance of being right because the operator can see the operation perfectly and has complete control of the machine from his working position at the rear. This feature is just another reason why the CINCINNATI Dial Types are so popular and desirable in shops where a wide range of work is handled. ¶ In the illustration a CINCINNATI engineered fixture is mounted on the table at a 60° angle to the table "T" slots. The operator loads the work piece by crane. From the rear working position his view of the milling operation is not obstructed, and positioning the work to the cutter

Navy E awarded March 6, 1942. Renewal star awarded August 29, 1942, along with Army-Navy E. The second star was awarded February 23, 1943, and the third star September 27, 1943.

THE CINCINNATI

MILLING MACHINES

this job without complete

REAR CONTROLS

Milling two angular pads on upper part of crankcase for aircraft engine. The machine is a CINCINNATI No. 4 High Speed Dial Type Miller.

CINCINNATI No. 3 Plain High Speed Dial Type Milling Machine. Catalog M-970-2 gives complete details on all sizes and models. For brief description, look in Sweet's Catalog File for Mechanical Industries.

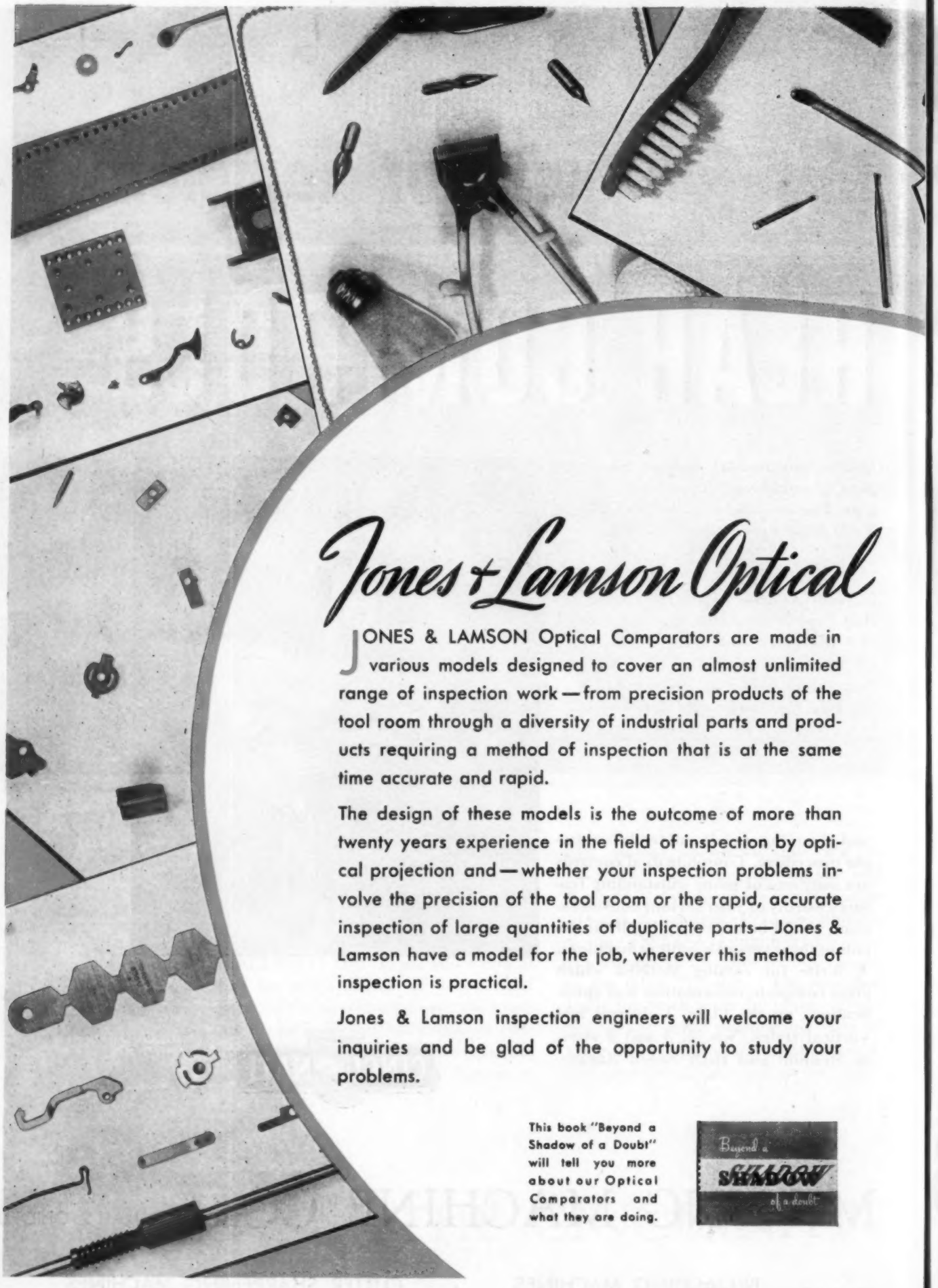
and changing speeds and feeds is a simple procedure. Complete dual controls are only one of many outstanding features worthy of your serious consideration. You'll be interested in all the details of these versatile milling machines.

¶ Write for catalog M-970-2 which gives complete information and specifications on the Plain, Universal and Vertical styles, Nos. 2, 3 and 4 sizes, in Medium and High Speed Ranges.

CINCINNATI

MILLING MACHINE CO. CINCINNATI 9, OHIO, U. S. A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES



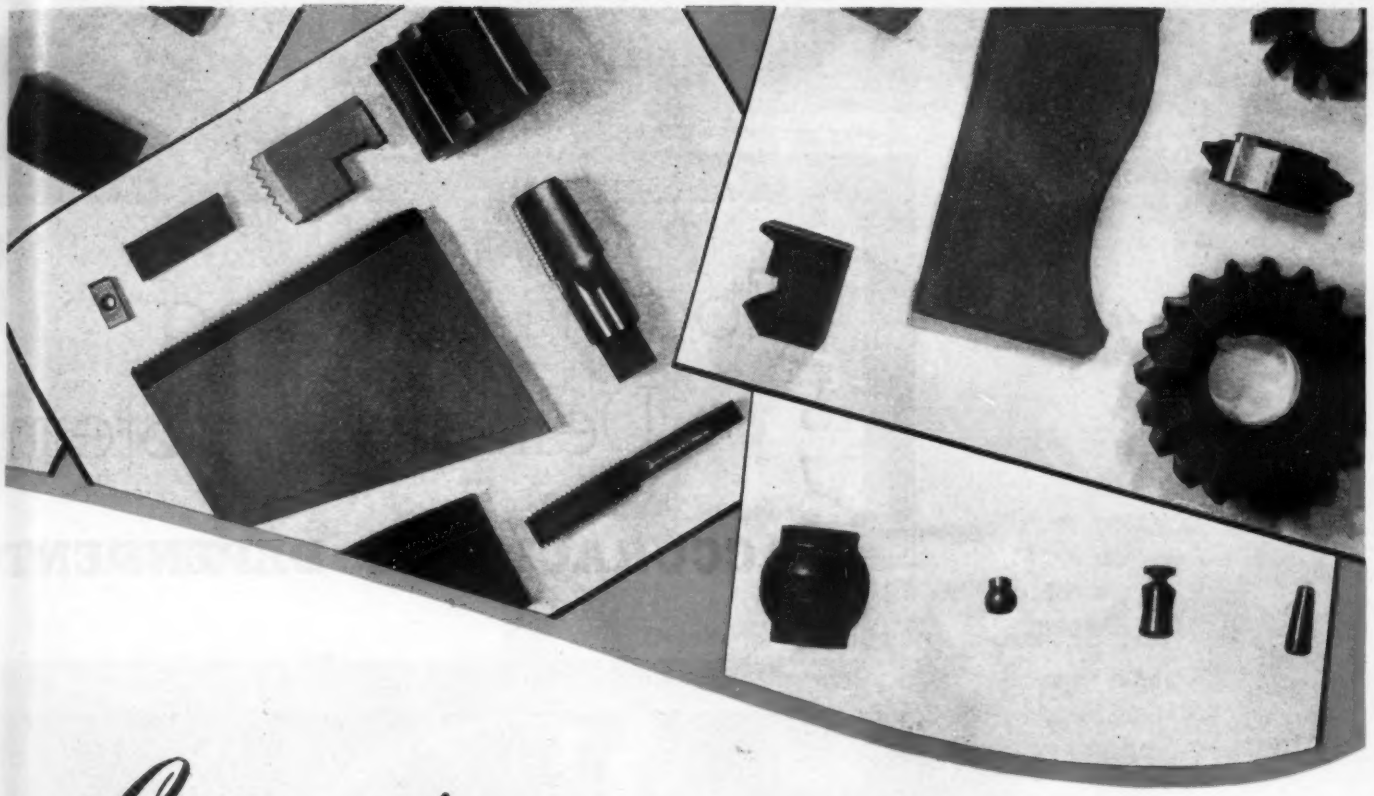
Jones & Lamson Optical

JONES & LAMSON Optical Comparators are made in various models designed to cover an almost unlimited range of inspection work—from precision products of the tool room through a diversity of industrial parts and products requiring a method of inspection that is at the same time accurate and rapid.

The design of these models is the outcome of more than twenty years experience in the field of inspection by optical projection and—whether your inspection problems involve the precision of the tool room or the rapid, accurate inspection of large quantities of duplicate parts—Jones & Lamson have a model for the job, wherever this method of inspection is practical.

Jones & Lamson inspection engineers will welcome your inquiries and be glad of the opportunity to study your problems.

This book "Beyond a Shadow of a Doubt" will tell you more about our Optical Comparators and what they are doing.



Comparators - A MODEL FOR EVERY JOB...

WHEN PURCHASING EQUIPMENT FOR MEASUREMENT AND INSPECTION BY OPTICAL PROJECTION, YOU SHOULD DEMAND:

1. Precision Condensing Lens System for controlling light.

2. Projection lenses that project a sharply defined image, free from distortion and color, *anywhere on the screen.*

3. Optically Flat Reflection Mirrors *sufficiently thick* to insure *permanent* flatness.

4. Provision for positively aligning the illuminating system, staging fixtures, projection lens, mirror and screen in correct relation to each other.

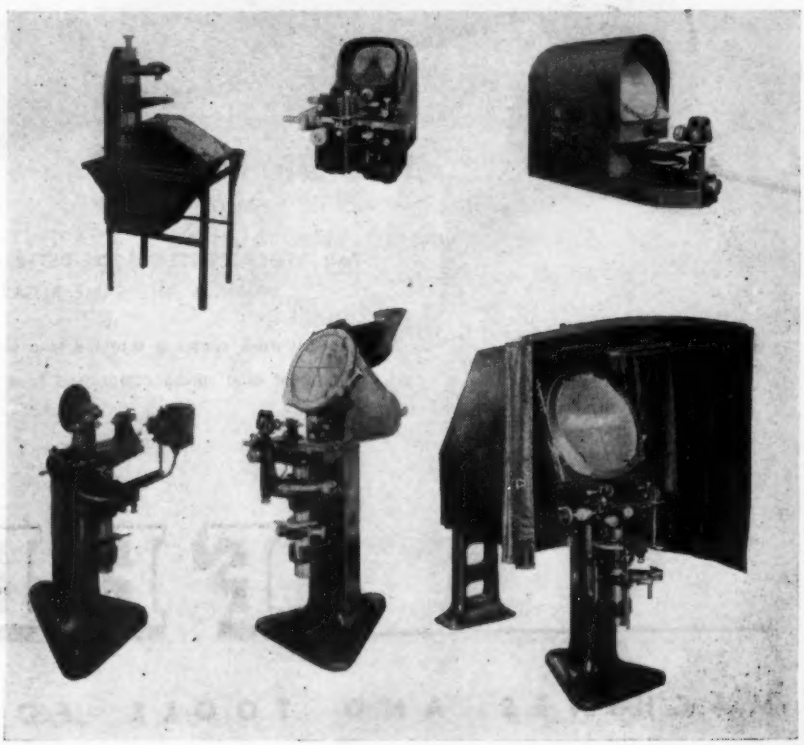
5. Rigid Machine Construction.

JONES & LAMSON
MACHINE COMPANY
SPRINGFIELD, VERMONT, U. S. A.

OPTICAL COMPARATORS

Manufacturers of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

PROFIT-PRODUCING MACHINE TOOLS



Tooth Shaving Delicate Stem Pi

ACCURACY NOT DEPENDENT ON

TAIL STOCK CENTER IS PRE-DETERMINED SPRING LOADED — END PRESSURE ON THE WORK IS THE SAME REGARDLESS OF OPERATOR'S SENSE OF TOUCH.

The tail-stock center is retained in a sleeve which exerts its holding pressure on the work under the thrust of a spring compressed to a definite preloading for each specific set up.

FELLOWS

MACHINES AND TOOLS FOR GEAR PRODUCTIO

m Pinions . . .

NT ON OPERATOR

Fellows No. 4 Fine-Pitch Gear Shaving Machine for gears from 1/8 inch to 4 inches pitch diameter — and 24 to 100 diametral pitch.

Heavy-handed Hank and diminutive Dotty turn out the same ± .0002" precision on this new FELLOWS Gear Shaving Machine.

The FELLOWS #4 FINE-PITCH GEAR SHAVING Machine designed for finishing small gears on a high production basis has proven a boon to manufacturers in the many industrial fields where gear precision is essential to product efficiency. With this machine, for example, gearing for many electronic devices can now be produced commercially at low cost.

Despite the fact that only microscopic chips of metal are removed from the gear teeth during this finishing operation, this machine does not require the attendance of a highly-skilled operator. Push button control makes simple loading and removal of the work substantially the only responsibility of the operator. Even the end pressure of the tail stock center against the work is predetermined spring loaded, and remains so regardless of the operator.

The No. 4 FELLOWS Fine-Pitch Gear Shaving Machine is only one of a line of gear production tools, which have been developed to meet the exacting requirements of modern gear design and production. Write for descriptive circular. The Fellows Gear Shaper Company, Springfield, Vermont — or 616 Fisher Building, Detroit 2, Michigan, or 640 West Town Office Building, Chicago 12, Illinois.

Method

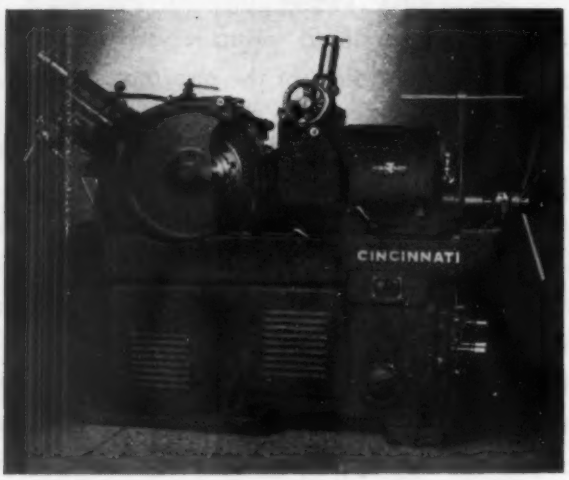
S

IO

. . . . FROM BLANK TO FINISHED GEAR

T

DO YOU KNOW THE LONG BAR GRINDING POSSIBILITIES OF THE CENTERLESS?



Round tubes, rods and bars of all types of metal are ground quickly, accurately and continuously on the CINCINNATI Centerless Grinder by using Cincinnati engineered Long Bar Fixtures. ¶ For the No. 2 machine, these fixtures are available in three standard sizes. Type A is for bars ranging in diameter from ⅛″ to 1¼″ and lengths up to 2½ feet. Type B for bars ⅛″ to 1¼″ in diameter and lengths up to 8 feet. Type C for bars ½″ to 2″ in diameter and lengths up to 18 feet. For the No. 3 machine, an additional size is available . . . type D for bars 1″ to 4″ in diameter, and lengths up to 18 feet; and ⅛″ to 1″ in diameter in lengths up to 8 feet. Then there is the non-metallic bar grinding fixture, for fibre and molded plastic tubes and rods, ranging in diameter from ⅛″ to 3″ and lengths up to 5 feet. ¶ The engineers here at Grinding Headquarters will be glad to discuss your long bar grinding requirements with you. Catalog G-456-1 gives specifications and full details on CINCINNATI No. 2 Centerless.

Front view of the CINCINNATI No. 2 Centerless Grinding Machine. Write for catalog G-456-1 which gives complete information on all features.

Navy E awarded March 6, 1942. Renewal star awarded August 29, 1942, along with Army-Navy E. The second star was awarded February 23, 1943, and the third star September 27, 1943.

CINCINNATI

CENTER TYPE GRINDING MACHINES

Grinding hollow piston rods for hydraulic machines, on a CINCINNATI No. 2 Centerless Grinder equipped with a Type C Long Bar Fixture.

GRINDERS INCORPORATED

INCINNATI 9, OHIO, U. S. A.

ENTERLESS GRINDING MACHINES CENTERLESS LAPPING MACHINES

SPECIFICATIONS

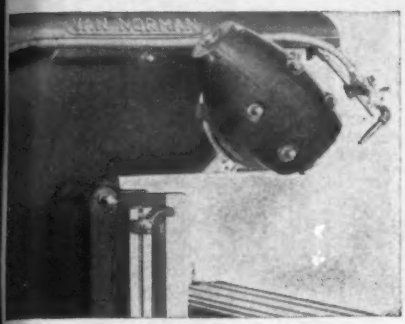
No. 36 UNIVERSAL MILLER. Table 58" x 1
speeds: 30 to 1500 rpm. 18 feeds: ⅛" to
Range: 35" longitudinal, 12" cross, 22¼" v

...IT PAYS TO

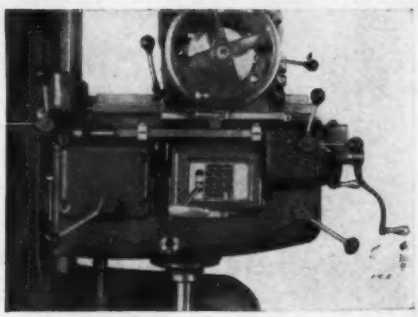
VAN NORMAN ADVANTAGES

that speed up production on

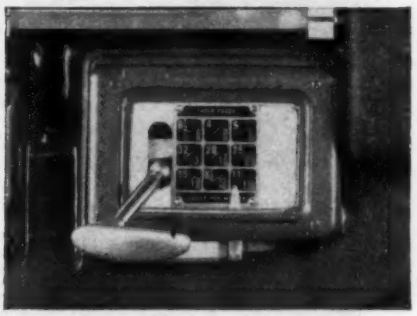
RAM TYPE UNIVERSAL MILLING MACHINES



1 ADJUSTABLE CUTTERHEAD



2 FRONT AND REAR DIRECTIONAL CONTROLS



3 SINGLE LEVER FEED SELECTOR

Van Norman Ram Type Universal Millers provide operators with three distinct operating advantages that increase work accuracy, minimize work reset-ups, lessen worker's fatigue and speed production.

1. The *adjustable cutterhead* gives you precision horizontal, angular or vertical milling by simply swinging the cutterhead to the desired milling position. This feature enables operators to perform most milling operations without changing the original work set-up. It saves valuable man and machine hours because there is no waiting for other types of millers to become available and changing the work from one miller to another is eliminated.

2. *Front and rear directional controls* of all power feeds, including the 6-way rapid traverse, enable the operator to operate the machine from either the front or rear of the machine thereby providing greater work visibility. These controls operate in the direction of the table, saddle or knee movement thus the operator always knows that the unit will move in the direction that the lever is positioned.

3. The *exclusive single lever feed selector* provides quick convenient selection of 18 feeds from 3/8" to 32" rpm. on No. 36 illustrated. The operator merely moves the selector lever up or down and right or left to the desired speed indicated by the coincidental pointer on the direct reading dial. A quick change speed selector, located on front of ram provides 18 speeds from 30 to 1500 rpm.

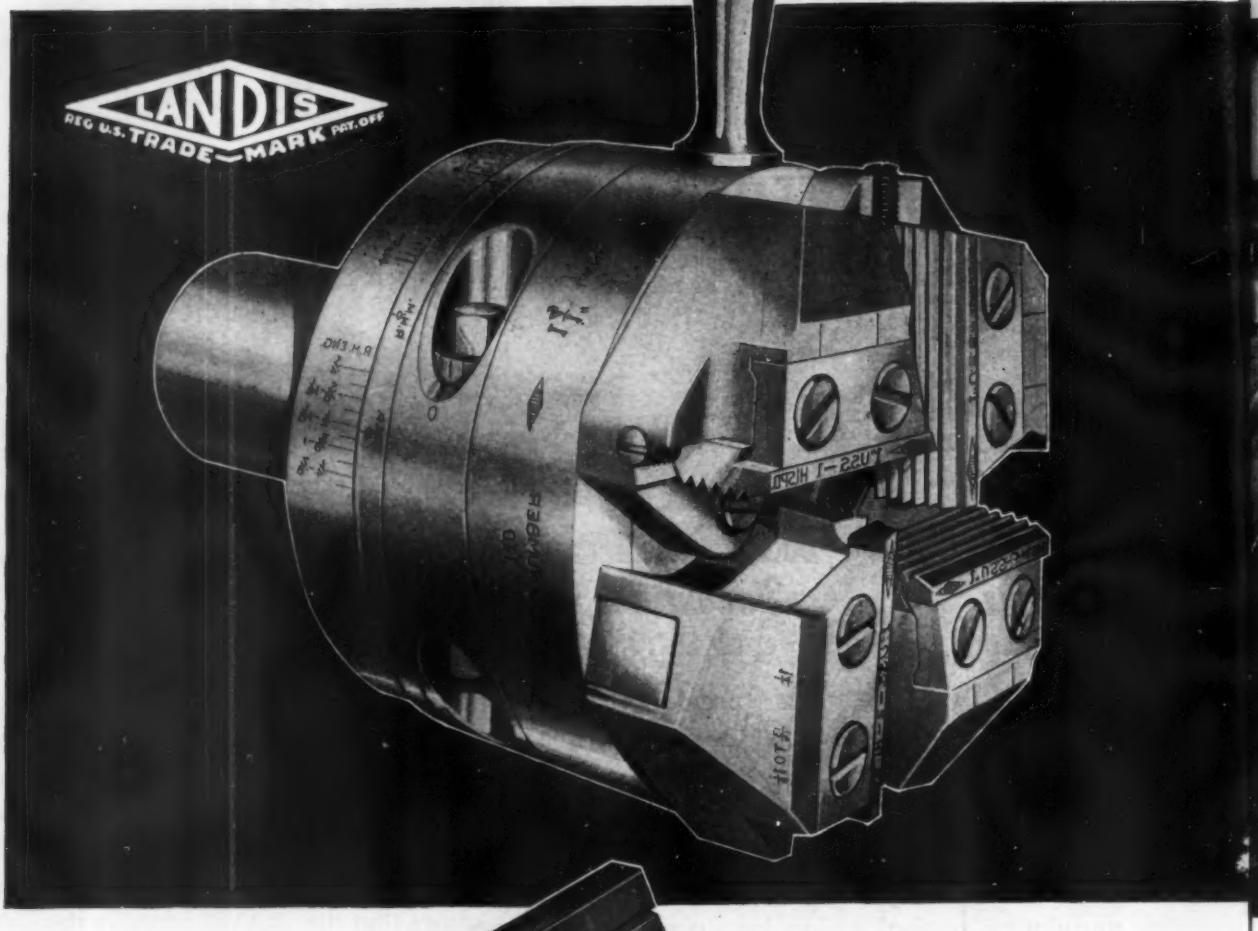
VAN NORMAN COMPANY

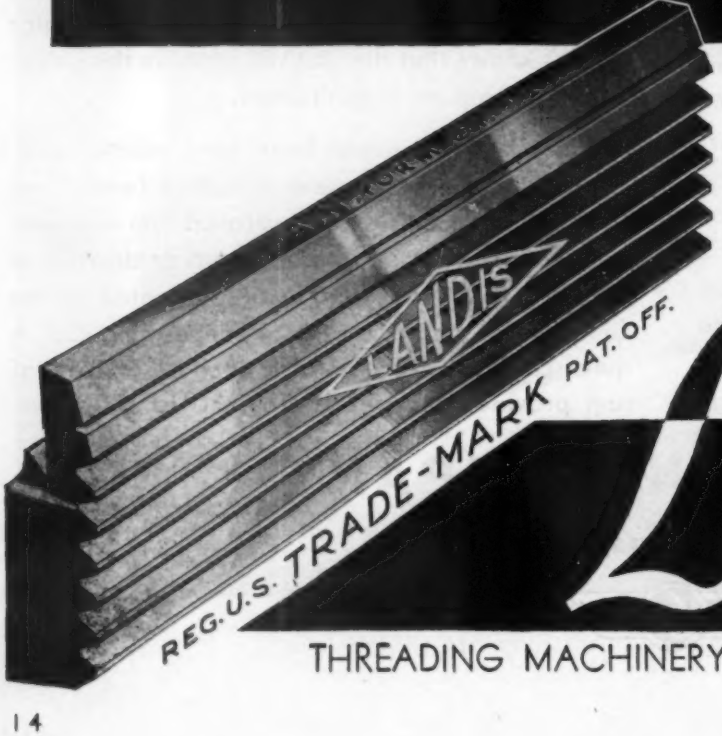
Springfield, Massachusetts

VAN NORMANIZE

FOR PRECISION THREADING

. . . In the Vital War Plant



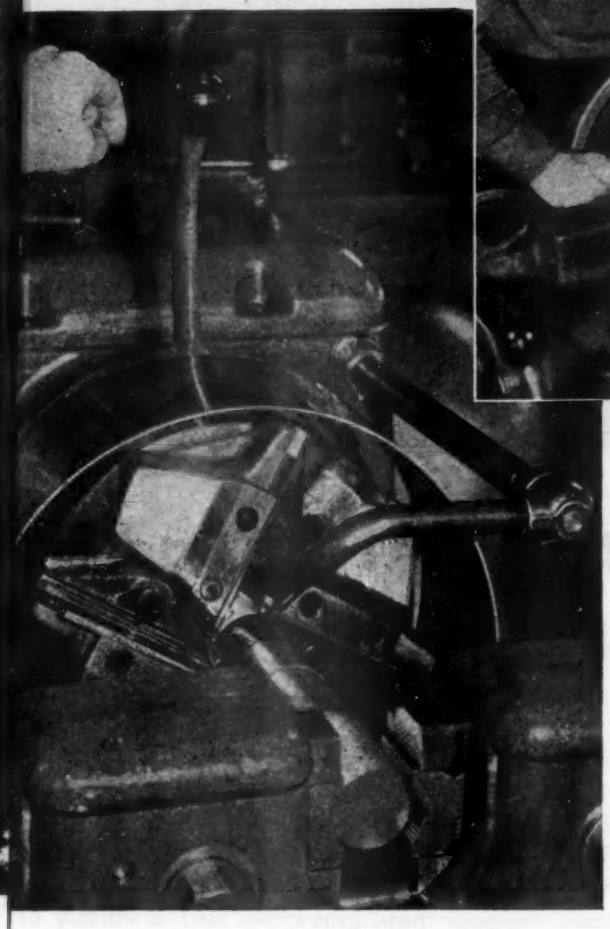


Investigate the LANDIS long-life Ta
gential Chaser as the means for ass
ing maximum thread cutting efficien

LANDIS

THREADING MACHINERY · THREAD CUTTING DIE HEADS · LA

LANDIS



LANDIS TANGENT TYPE CHASERS INCREASE PRODUCTIVITY

with

HIGHER THREADING SPEED
LONGER RUNS BETWEEN GRINDS

One eastern manufacturer increased the production of alloy steel studs more than 100% by employing LANDIS long-life chasers. Twenty-eight linear feet of threads are produced per hour as compared with 12 linear feet by a prior method. Furthermore an average of 15 bars, more than 5 hours' continuous production, are threaded before the chasers require regrinding.

Threads are held to class No. 3 specifications—Cost is reduced to the minimum.

MACHINE CO. WAYNESBORO PENNA. U.S.A.

COLLAPSIBLE TAPS · PIPE THREADING AND CUTTING MACHINES

"AMERICAN" Radials Help Build Submarines

Where accuracy standards are rigid and production essential "AMERICAN" Hole Wizard Radials are meeting the challenge in a gratifying manner.

The two Hole Wizards shown here are hard at work on miscellaneous drilling jobs encountered in submarine production. Because these jobs cover such a variety of drilling, boring and tapping "AMERICAN" Hole Wizards are particularly suited owing to their flexibility, their ease of control, their boring ability and high speed tapping facilities.

For all-out production, select "AMERICAN" Hole Wizards—hundreds of contractors are thankful they did.

THE AMERICAN TOOL WORKS CO.
CINCINNATI, OHIO, U. S. A.

"AMERICAN"

FOR
ALL-OUT
PRODUCTION

"AMERICAN" *Hole Wizard* RADIAL

LATHES and RADIAL DRILLS

Official U. S. Navy Photo

Where **shorter** responses mean **longer** life . . .

W·A·B *controls are serving*

Clearing the way in amphibious landings—breaking trail for battleships, carriers, cruisers, and destroyers—riding herd on convoys and doing anti-submarine work—minesweepers have a job second only to submarines in the hazards encountered. Precise and immediate response to the orders of the bridge may often mean the safety of the vessel, and the success of a mission. W·A·B Controls are now serving on a number of minesweepers.

* * * *

The marine field is only one of many where W·A·B Controls are helping or can help to solve difficult control problems. The job the controls are doing here gives an excellent picture of their possibilities, and may suggest places where they can serve for *you*.

W·A·B Control Systems for ships concentrate command of all engine maneuvering in small, compact stations, located on the bridge . . . in the engine room . . . or both. The entire cycle of engine maneuvering . . . speed control, clutching, braking and reversing . . . is governed by the movement of a small handle. Load balancing and synchronization of multiple-engine drives is simplified, simple interlocks prevent damage to equipment through operating errors.

If your post-war planning for your plant or your product requires a safe, simple, completely dependable control, it will pay you to investigate W·A·B Controls.

Westinghouse Air Brake Company

INDUSTRIAL DIVISION

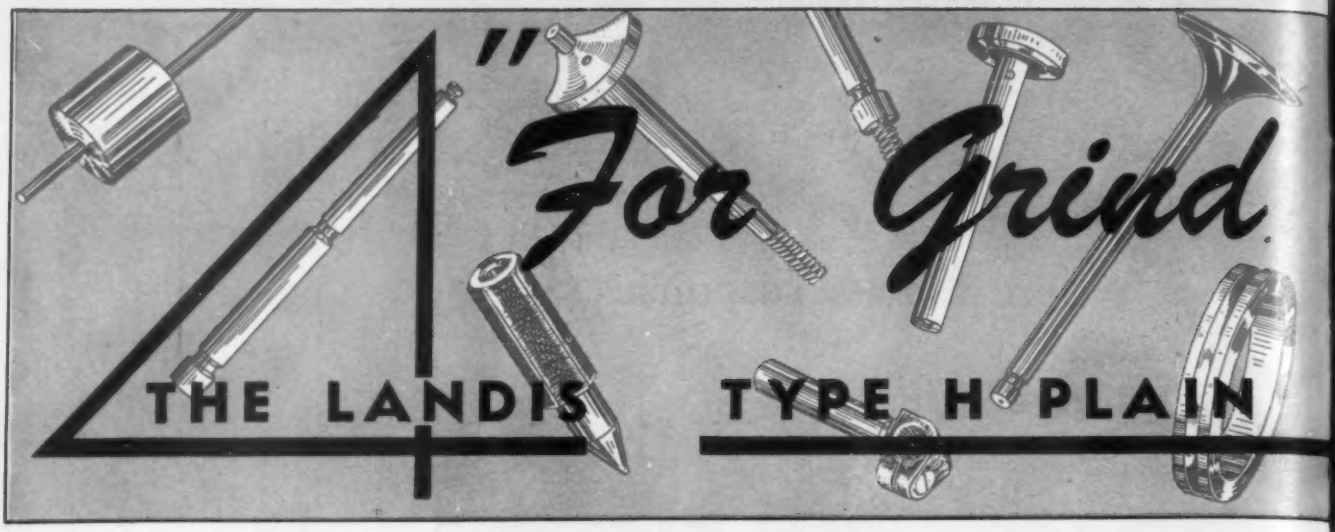
General Offices: Wilmerding, Pa.

75 Years of Pneumatic Control Experience

W·A·B

Pneumatic . . . Pneumatic-Electric . . . Pneumatic-Hydraulic

control systems



This matter of accuracy is relative—

You can grind work within unbelievably close limits if . . . if cost and time consumed are not taken into consideration. Just as they should be, however, these are the two determining factors.

When accuracy of output is claimed for the Landis 4" Type H, economical production is included. So is the possibility of using operators with limited training. And so is the assurance that results will be consistent day after day, job after job.

There is nothing mysterious about the design and manufacture of a successful modern grinder. Build accuracy into it and you get accuracy out of it. Landis Tool, one of the few organizations with the necessary experience and know-how, has applied this formula to the Type H.

The examples of accuracy on these two pages were chosen because they are outstanding. Many parts cannot or need not be ground within such limits. But here is the machine that will do it when necessary and when conditions permit. 428

1 Electrical instrument manufacturer grinds small shafts easily within a limit of plus or minus .00015". Generally speaking, instrument parts are exceedingly small and must be ground within a close degree of accuracy. Here is a use for which the 4" Type H is particularly well fitted.

Unusual Performance as Usual

2 Miscellaneous parts manufacturer uses a battery of these machines for straight infeed grinding numerous small pieces. An average limit of .0002" is maintained. New operators are turning out 1000 pieces in 10 hours, generally without a single scrap piece.

3 Small instrument manufacturer grinds journals within a limit of .0003", while at the same time holding production at an exceedingly high rate. Two journals of like size at either end of one part are ground by turning the piece end for end with 240 surfaces turned out per hour. A large journal at one end of the piece only is ground at the rate of 180 per hour. Stock removal is .008" and the material is cast steel.

ACCURACY

4 Diesel engine manufacturer uses a number of 4" Type H Grinders for miscellaneous small parts. Accurate results are secured in every instance, coupled with a considerable step-up in production. For example, one machine is straight infeed grinding a 1 1/8" diameter at the rate of 170 pieces per hour compared with the production of 100 pieces per hour on the machine previously used. Still another of the group is set up to grind the lap diameter of a small part which is held within a limit of .0001"—an unusual operation but indicative of what the 4" Type H will do.

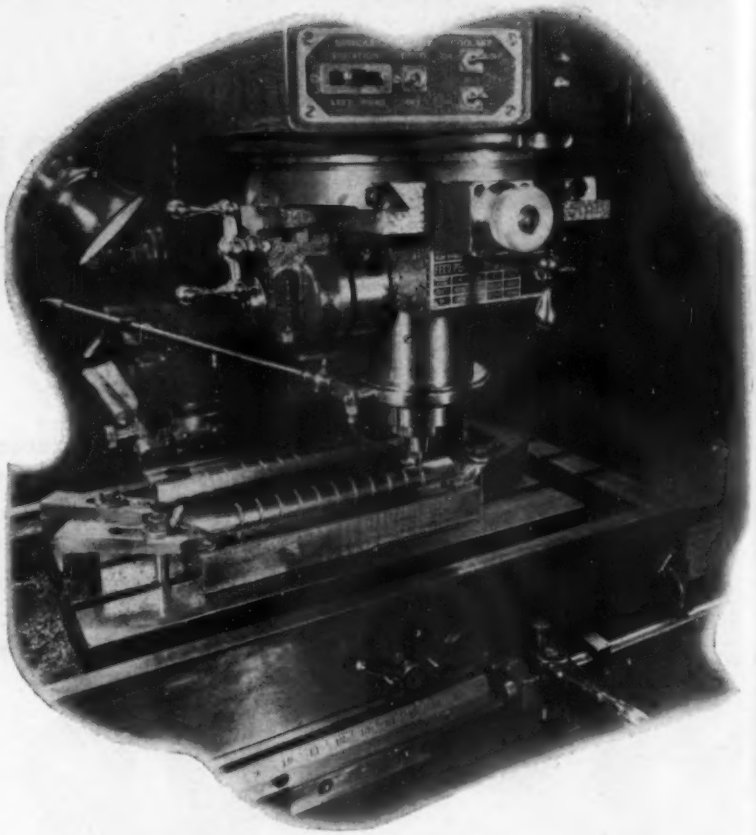
5 Ball bearing manufacturer form grinds the outer raceway of small inner races, holding to a limit of .0002" concentricity and .0005" diameter. Production is 128 per hour. During this operation, which is the finishing operation, .005" stock is removed.

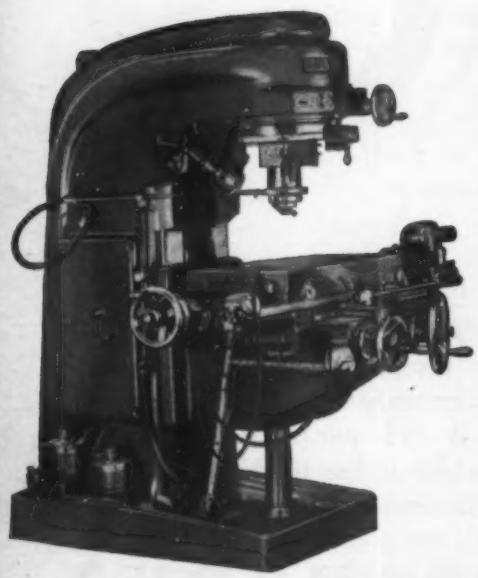
LANDIS TOOL COMPANY
WAYNESBORO—PENNSYLVANIA

ROTARY HEAD MILLER . . . PLUS CHERRYING ATTACHMENT . . . SIMPLIFIES THIS "*TRICKY*" MILLING OPERATION

The Milwaukee Rotary Head Miller equipped with a cherrying attachment made "short work" of the *"tricky"* milling required on this injection mold. It took just two hours to complete the job — far less time than by any other method known.

The cherrying attachment is an auxiliary rotary head, mounted at 90° to the head of the miller. It is used to mill circles and angles in a vertical plane. When used with rotary head motion, spherical and conical cavities can be accurately and rapidly milled — in almost all cases difficult operations become a comparatively simple task.





KEARNEY & TRECKER'S ROTARY HEAD MILLER

The Most Versatile Machine Ever Designed for Mold and Die Work

DIRECT . . . mills mold cavities in a single set-up without the aid of templets or models.

ACCURATE . . . chances for error are eliminated because there is no change in set-up. Exact control of all combinations of cutting movements —possible only with this machine— transmits mathematical precision to the work.

FAST . . . initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of intricate molds and dies is the result.

Write for Bulletin No. 1002C for complete information on the Milwaukee Rotary-Head Miller and the accurate and rapid production of all types of molds and dies.

Rotary Head Milling Machine
•
Autometric Jig Borers
•
Center Scope

Kearney & Trecker *Products*
CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
•
Milwaukee Midgetmill
•
Milwaukee Speedmill

a drop in time saves . . . TROUBLE!

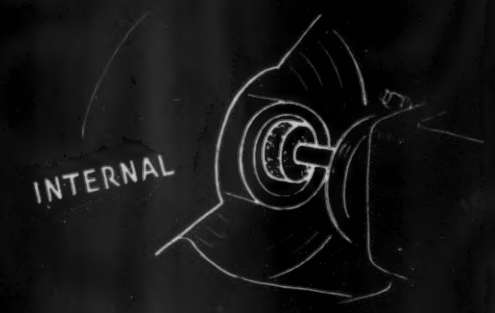
PUT SEVERAL DROPS OF OIL IN ALL OIL CUPS TWICE A WEEK!

A little oil at regular intervals is the best protection. A lot of oil, too late, won't save an injured part.

GISHOLT

★ *Reproductions of this page on enameled paper are available for bulletin-board use in your turret lathe department. Write the Gisholt Machine Company, 1201 East Washington Avenue, Madison, Wisconsin. Ask for the series of "Wartime Care and Operation Posters." State quantity desired.*

Announcement
NORTON GRINDING WHEELS OF
#57 ALUNDUM ABRASIVE
now available
to everybody
QUICK FACTS
About 57 Alundum
Grinding Wheels
They stay sharp for a long while
They take heavy feeds without burning
They need few dressings
They hold shape well on form grinding



A Proved Success on Special War Jobs

. . . Now You Can Get 57 ALUNDUM WHEELS for Any Production Job

DEVELOPED by the Norton research laboratories several years ago, 57 Alundum Abrasive was an immediate and outstanding success in wheels for many grinding jobs. Unfortunately, however, limited production facilities made it necessary to restrict the use of these new wheels to those special war jobs where their particular virtues were most marked—especially in the aircraft industry.

Increased production facilities now make it possible to offer grinding wheels of 57 Alundum Abrasive for all of your jobs where increased production is vital.

The experience gained with 57 Alundum wheels during the restricted period has proved conclusively their outstanding merit for internal grinding, cylindrical grinding, crankshaft grinding, centerless grinding and snagging (slow speed). They have also worked well on some types of surfacing jobs and for some tool grinding work.

Norton research has combined in 57 Alundum Abrasive the fast, cool cutting action that is typical of 38 Alundum Abrasive with the durability and toughness that is characteristic of regular Alundum Abrasive.

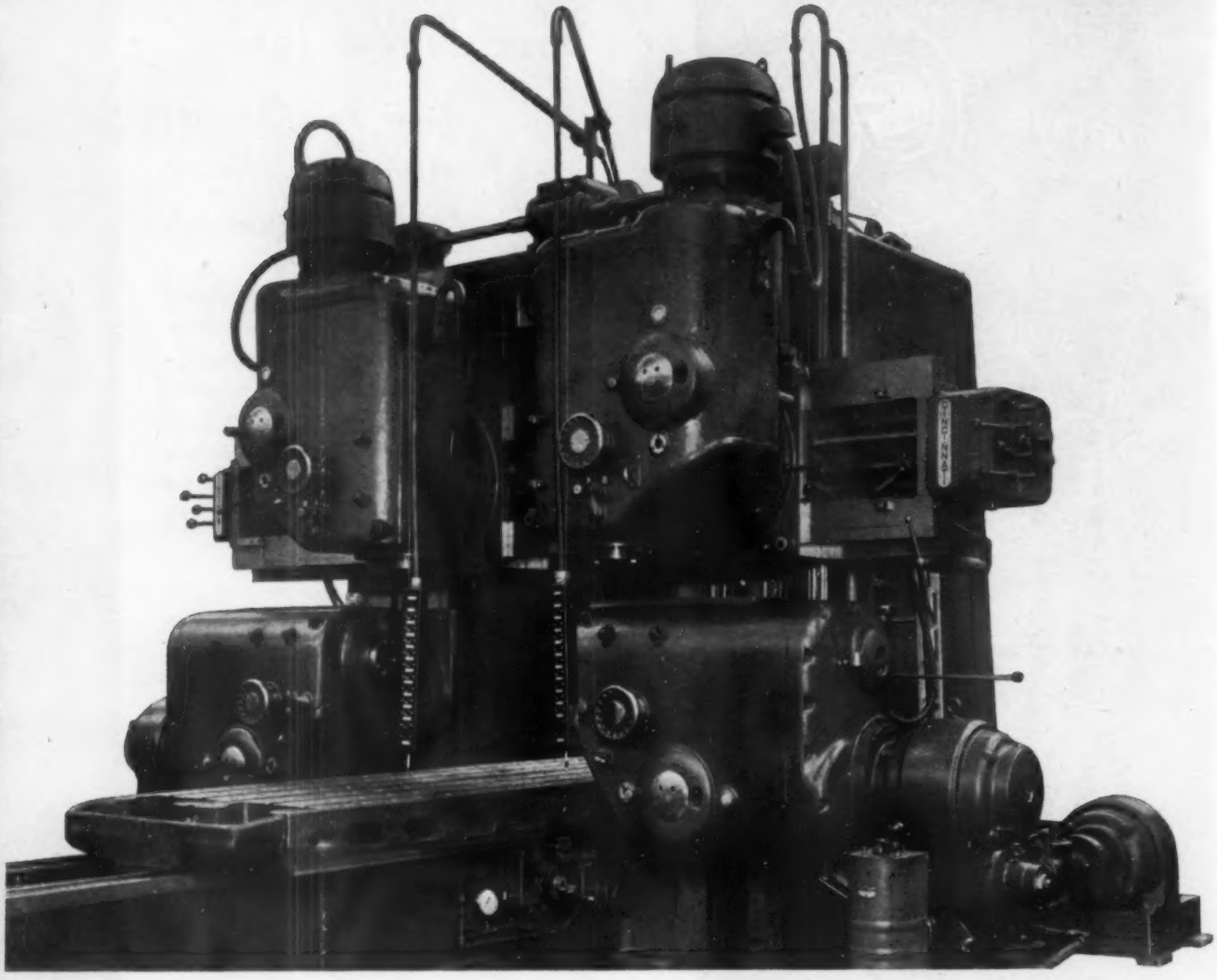
Get in touch with your Norton abrasive engineer and let him show you on just which of your jobs you can use 57 Alundum Grinding Wheels to real advantage.

NORTON COMPANY
Worcester 6, Massachusetts

W-955

NORTON ABRASIVES

CINCINNATI HYPRO



PLANER TYPE MILLING MACHINE

This 48" x 48" x 14' Cincinnati Hypro Planer Type Milling Machine with 9½" milling heads is machining parts for diesel engines that will drive submarines and surface ships to Victory on five oceans.

The combination herringbone gear drive to the table provides the same smooth power transmission that big ships enjoy through use of herringbone construction of their turbines.

Each head is completely self controlled with the spindle powered by an individual motor. All shafts in the spindle drive are anti-friction bearing mounted. All gearing is of hardened alloy steel mounted on integral multiple splined shafts. Each milling head has a spindle range of from 10 to 200 R.P.M.

The rail provides a solid narrow guide bearing for the saddle which prevents tilting action when cross milling. Cross travel friction is reduced to a minimum by anti-friction roller bearings.

• Write today for Bulletin 1050 which gives a complete illustrated description of this Cincinnati Hypro Planer Type Milling Machine's Hyproduction features.

THE CINCINNATI PLANER COMPANY

Planers...Vertical Boring Mills...Planer Type Millers

CINCINNATI . OHIO . U.S.A.

Wage rates are UP but cutting costs CAN COME DOWN!

★ Sound postwar planning will include a searching analysis of mechanical equipment, to be sure no opportunity is lost to lower production costs. Only this way can the price of postwar commodities be kept within the reach of everyday buyers. Otherwise, sales will be scarce, production low, and "full employment" cannot be attained.

The use of modern machine tools in increased numbers, and at their highest efficiency, is one of the surest ways of cutting costs. For instance, Monarch lathes cut production costs and produce more parts with greater precision and fewer rejects. Such tools should be "musts" on your reconversion timetables.

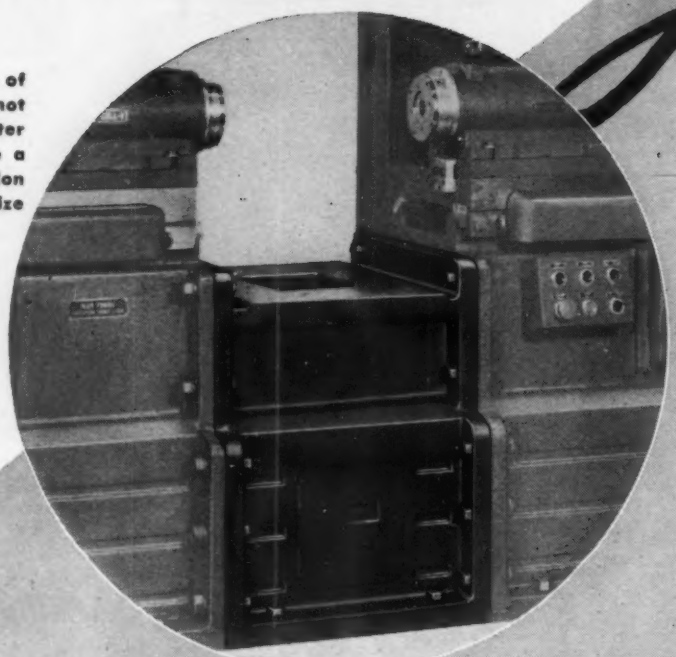
It is time, now, to make your machine tool surveys. Monarch engineers can help you. Under the pressure of war production, they have devised many turning shortcuts that can be applied equally well to peacetime products. Our practical experience in utilizing the many timesaving features of Monarch lathes is at your service, to help you produce more goods for more people, at lower cost.

THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

MONARCH LATHES *Save Time*

Increasing

Illustrated to right is Ex-Cell-O method of bolted construction. This feature provides not only added strength and rigidity but greater flexibility. When it is desired to machine a part of different dimensions the center section can be removed and one of a different size substituted.



Ex-Cell-O machine illustrated below is an opposed Style 58 two-way machine arranged with six boring spindles at each end for finish boring, counterboring and facing the gear holes in an aluminum supercharger cover. All spindles operate simultaneously, finishing the holes within .0005 at a highly satisfactory production rate. The units have 20 inches of table travel and 15¾ inches between the ways. Each spindle is individually adjustable for quick setting. In this particular application all centers are set to a master gage, in effect, a master for the part itself.

XLO

EX-CELL-O *for* PRECISION

SPECIAL MULTIPLE WAY-TYPE PRECISION BORING MACHINES • SPECIAL MULTIPLE PRECISION DRILLING MACHINES • PRECISION THREAD GRINDING, BORING AND LAPPING MACHINES • BROACHES • HYDRAULIC POWER UNITS

PRODUCTION *with new economy!*

Ex-Cell-O Unit-type Precision Boring Machines Bring Added Practical Features

Ex-Cell-O has developed standard boring units, each a complete machine in itself, yet by means of heavy flanges and bolts these units can be bolted singly or in multiples to a stationary center section, resulting in a multiple precision boring machine. Note these advantages:

It is still a *precision* boring machine. Bores may be finished in tenths of thousands as before, yet units may be mounted in multiples and at angles, all operating simultaneously toward the center section.

Because all units may operate simultaneously, production is considerably increased on many parts.

The unit-type construction allows for salvage of all but the fixtures in case of part changes. It is possible and economical merely to remove and replace the entire center section. This means a flexible machine on which maximum production can be obtained while the machine is set up.

Each way or unit has two feeds and a dwell in forward and reverse direction, and each can be controlled individually or by a central control button in conjunction with all other units hooked into the electrical panel. It is completely automatic except for loading and unloading.

More than most semi-special machines, this Ex-Cell-O machine incorporates desirable features in flexibility and production, for war work today and many peacetime products tomorrow.

EX-CELL-O CORPORATION • DETROIT 6

Ex-Cell-O has just printed a new folder on Unit-type and other Way Machines. A copy is yours for the asking. Send to Ex-Cell-O Corporation, Detroit 6, Michigan, and specify Bulletin 31631.

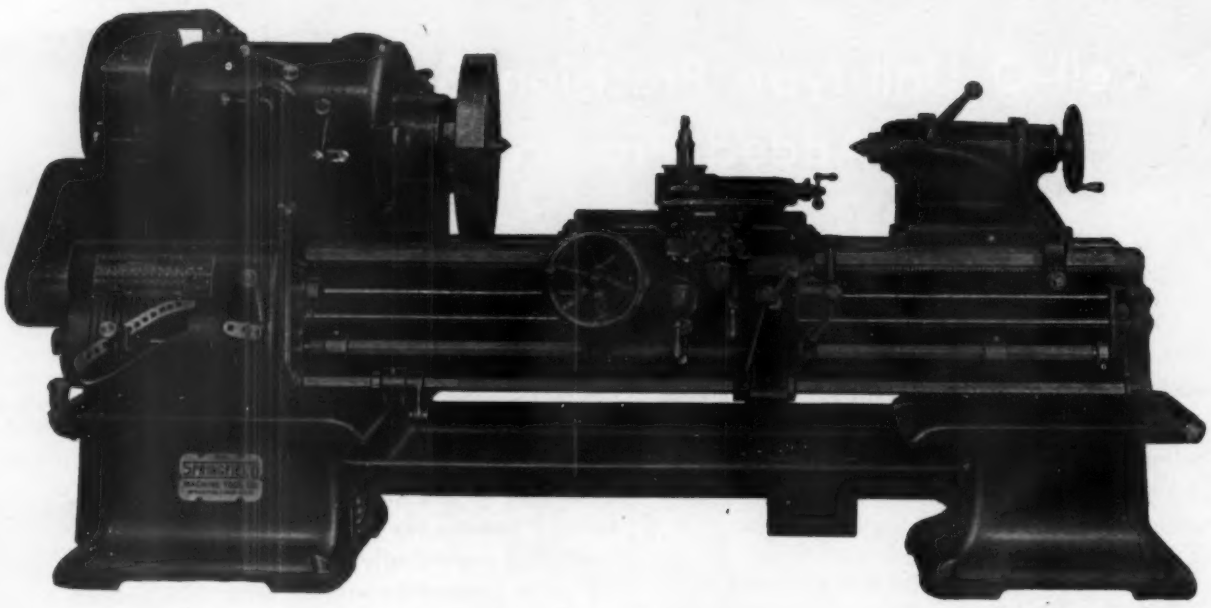
Where high production, accuracy, and economy through multiple operations are required consult EX-CELL-O.

GRINDING SPINDLES • DRILL JIG BUSHINGS • CONTINENTAL CUTTING TOOLS
TOOL GRINDERS • DIESEL FUEL INJECTION EQUIPMENT • R. R. PINS AND
BUSHINGS • PURE-PAK CONTAINER MACHINES • PRECISION AIRCRAFT PARTS

FOR CONTINUED ACCURACY OVER A GREAT NUMBER OF YEARS

SPRINGFIELD

PRECISION LATHES



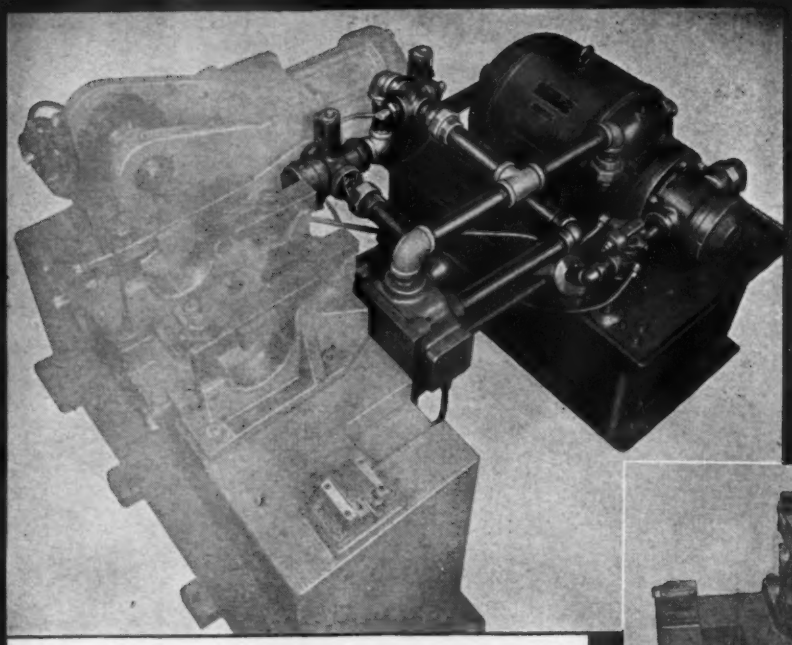
● Extreme accuracy and long life obtained from Springfield lathes is due to the deep, well ribbed bed made from High Test Chrome Gray Iron. Made in our own Foundry, we have found from exhaustive metallurgical and wear tests by professional laboratories and actual operation in the field that this material gives greater wear resistance, freedom from scoring and freedom from internal strains. As a result you get greater accuracy throughout the life of the lathe.

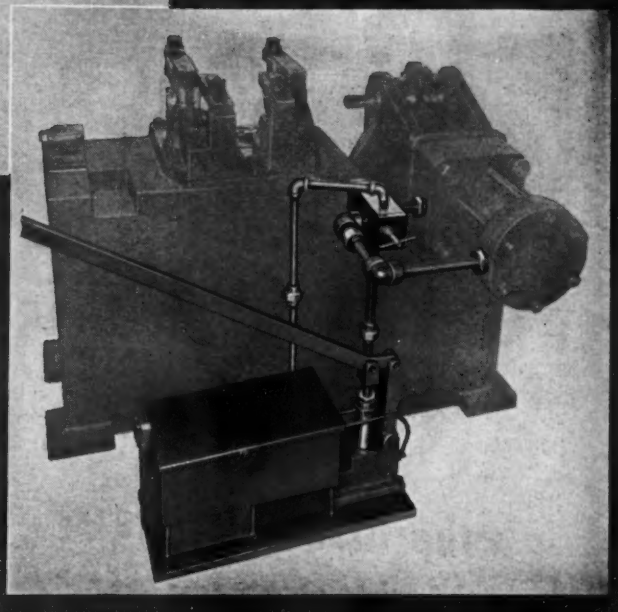
Designed right – built right – and made of scientifically correct materials – Springfield lathes are giving continued accuracy over a greater number of years.

Thinking in terms of heavy production demanded in war times and for the peace time output to follow, you can't go wrong with a Springfield lathe. Sizes range from 14" to 30".

The SPRINGFIELD MACHINE TOOL Co.

SPRINGFIELD OHIO U.S.A.





TWO JUMPS AHEAD WITH BETTER TOOLS

We're getting the jump on every fighting front with better weapons. Back of better weapons lies better tools of production of all kinds. Back of better special tools is better special tool designing—for Vulcan it has been a lifetime career nurtured for thirty years and crowned with outstanding achievement in this war.

Fortunately in the midst of war work you can delegate the designing of the special tools for your peace time production. You'll be one jump ahead of peacetime competition because they are better. You'll be two jumps ahead because they are ready.

Ask for the Brochure. It will acquaint you with Vulcan experience, facilities and service.

VULCAN TOOL Co.

[illegible] BECKEL STREET DAYTON, OHIO

[illegible] • TOOLS • DIES • JIGS • FIXTURES

PRECISION

the first objective of this battery of

THOMPSON GRINDERS

● Although a smooth finish and accurate grind to predetermined tolerances is of first importance, this battery of Thompson Grinders is also doing a first rate job on production.

As to tolerances—here's how they line up on three of the jobs—

1. Finish grind head of knuckle pins for airplane motors .002 limit on length, .002 limit on width.
2. Grinding centerless grinder work rest blades made of tungsten carbide in 3 steps—first .002 second + .0002 third—.0000.
3. Grinding oil flat on magneto shaft housings to .002 limit for airplane motors.

This is typical of the wide range of precision grinding operations being accomplished in a host of plants on Thompson Grinders.

The full hydraulic operation of both head and table movements—the self contained wheel truing all contribute to the smooth, accurate work produced and high productivity of Thompson Grinders.

★

CONSULT THOMPSON

on your precision grinding work. Full range of types and sizes up to 36" x 36" x 240".

★

THE Thompson GRINDER CO.

SPRINGFIELD, OHIO

There are many GOOD THINGS AHEAD . . .

Soybeans will certainly be one of the country's important crops in the future. A single acre of land devoted to them will produce about seven times as much protein as it would if planted to corn for the feeding of hogs.

The war has checked the spread of quick-freezing locker plants which were spreading across the country from the farming states at the rate of about fifty new plants each month. A million patrons are already withdrawing two million pounds of food from their lockers daily. Home-sized quick-freezing units will probably be combined with mechanical refrigerators in after-the-war models.

The fluorescent tube may have many uses besides those already familiar. Inks that show under ultra-violet light are already in use to mark laundry, and are being tried out in hospitals for the identification of babies. Fluorescent materials help in the detection of theft and sabotage, and in the detection of altered documents. Fluorescent lighting distinguishes between butter and margarine, determines the freshness of eggs and nuts, or the adulteration of coffee, lard and olive oil. Experts can even tell, with its help, from what flowers a sample of honey has been made.

Powdered glass is being pressed into shapes and fused by heat in a manner similar to the technique used for powdered metals.

A machine is reported in which a photo-electric cell scans a drawing and operates a machine that produces the part shown in the drawing.

Cotton, laminated with thermo-setting plastics, is being tried as a substitute for sole leather . . . semi-flexible, water repellent, and similar in appearance to leather, but longer wearing.

New "rare-element" glass that contains no sand makes optical glass for camera lenses with twice the speed of any former lens.

A new method of cutting metal uses slightly worn band-saw blades run at approximately ten thousand feet per minute. The high speed of the saw actually melts the metal in its path.

Baking dishes can now be made of special paper that resists heat to 350 degrees.

The photo-electric cell (or electric eye) was first introduced to the public as an automatic door-opener. Now it sorts fruit, smoke and fire, levels elevators, records automobile speeds, counts pills, matches colors, sorts merchandise, turns on lights, measures machined parts, detects flaws in metal and is the heart of television. Its use has only begun.

Backyard gardeners will be pleased to know that experiments are being made with high-frequency currents to kill insect pests in the ground.

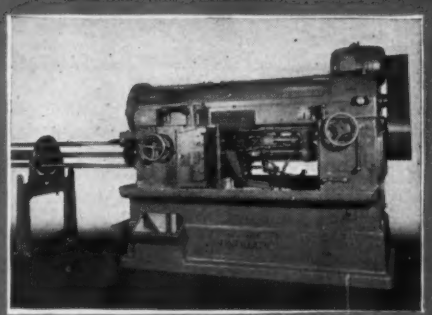
An immediate post-war demand is expected for two million one-hundred thousand automobiles, one-million five-hundred thousand mechanical refrigerators, one-million two-hundred thousand washing machines, one-million two-hundred thousand radios, nine-hundred thousand electric irons, and six-hundred thousand electric sewing machines.

The Basic Magnesium, Incorporated, plant near Boulder Dam, largest single electrical installation in the country, uses eighteen million dollars worth of silver in place of copper to carry its current.

A patent has been issued for a method of transcribing eight hours of continuous reading by variably magnetizing a spool of fine wire the size of an ordinary spool of cotton. With this wire in a radio-like machine, a housewife could attend to her domestic chores and listen to the reading of an entire book at the same time.

A new camera takes three million pictures in a single second.

If you are looking ahead
you will be interested in production like this



This 4¼" bronze valve stem is produced on the 6-spindle Conomatic in nine seconds — nine seconds for eleven operations including four forming cuts, four cuts with roller turners, two threading operations and cutting off — all to close tolerances.

This is real production — the sort of production that is winning the war — the sort of production that you will need in your plant to meet competition when the war is over.

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U. S. A.

AUTOMATIC PRECISION GRINDING

HORIZONTAL
VERTICAL

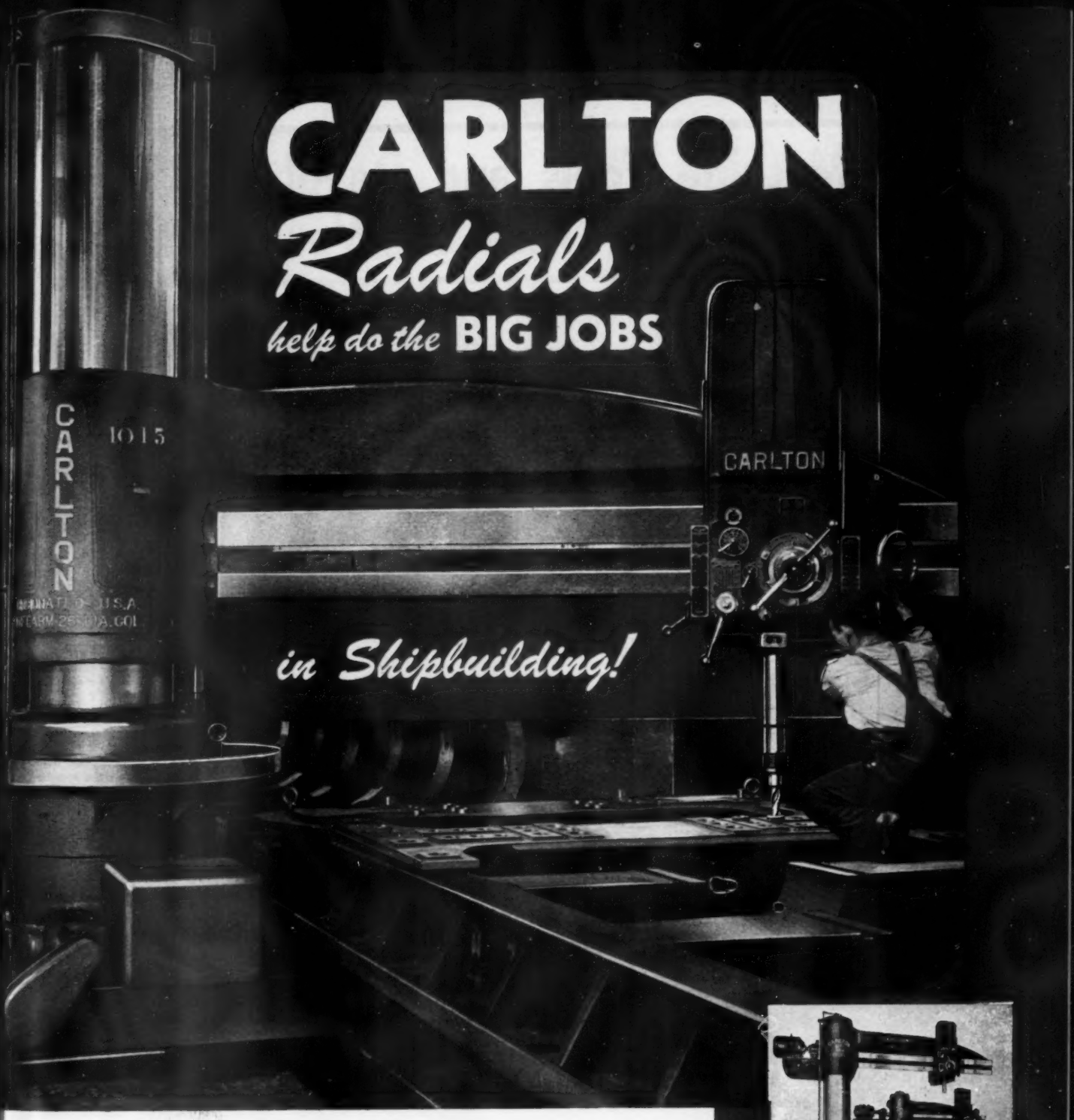
WITH the prevailing shortage of skilled manpower, the necessity for Automatic Precision Grinding equipment is greater than ever before. HILL *Open Side* Hydraulic Surface Grinders are today producing ground finishes to extremely close tolerances with operators whose experience is limited to the present emergency • Your production schedule on finish ground parts can be easily maintained with a HILL Horizontal Spindle *Open Side* heavy duty precision surface grinder • A complete range of sizes from 5 to 20 feet long are available with table widths of 18, 24, 30 and 36 in.

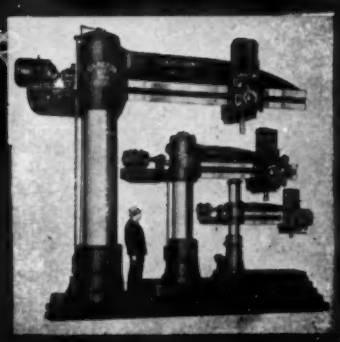
ALSO BUILT IN VERTICAL SPINDLE DESIGN

The HILL ACME Co.

6400 BREAKWATER AVE • CLEVELAND, OHIO

CARLTON *Radials* *help do the* BIG JOBS *in Shipbuilding!*





The photograph above shows a large, 26" Diameter Column, Carlton Radial Drill with a 10 foot Arm, mounted on a Portable Base which moves along the track on wheels. Every operation is controlled by push button from the Head, which includes locking and unlocking the truck to the rails and propelling the Machine along the rails to bring the machine and the drill to the work rather than move the work. The Arm can be elevated to take 10 feet under the spindle.

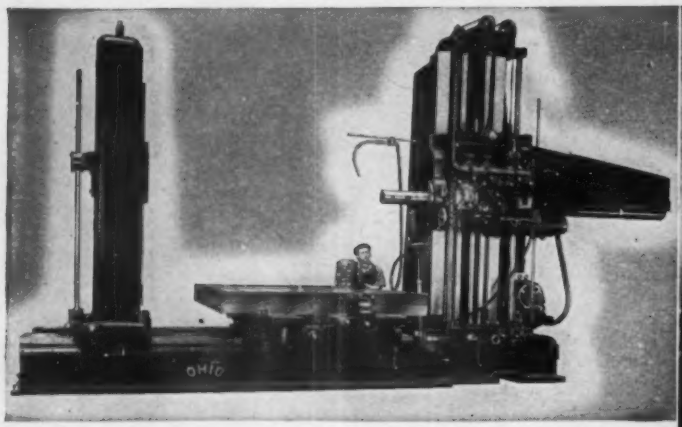
This fine installation is shown in operation at Nordberg Manufacturing Company plant where a number of smaller Carlton Radial Drills are also in operation.

A great many of these Carlton Portable Type Radial Drills are installed in plants throughout the country.

If you have any drilling problems, write to Carlton for complete information.

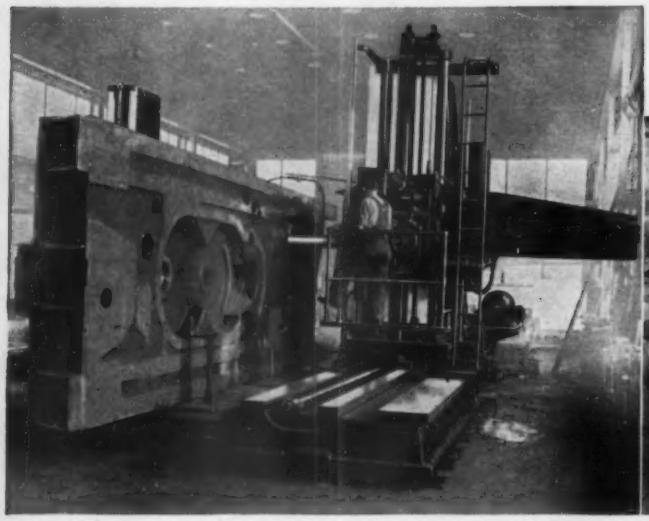
Carlton
MACHINE TOOL CO.
CINCINNATI, OHIO

OHIO Machine Tools and Revolving Tables are Rapid, Proven Aids to War Production

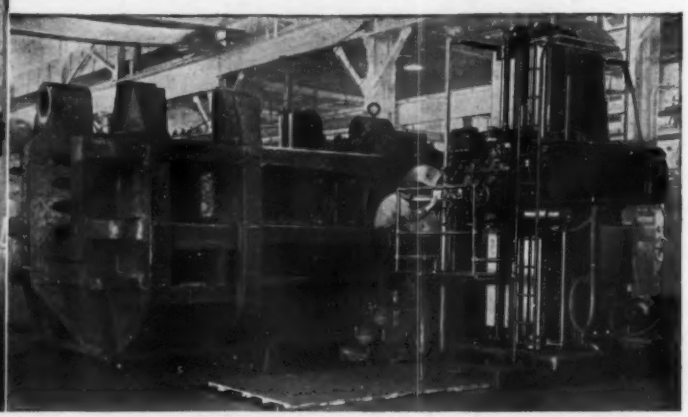


Ohio Horizontal Boring, Drilling and Milling Machines are available in 5" and 6" spindle sizes in both table and floor types. Above: Extra heavy duty table type with time-saving portable control cabinet. Get new Bulletin 1000.

Ohio Horizontals are noted for their power, precision, convenience and safety. Heavy duty model, table type pictured above. Bulletin 310.

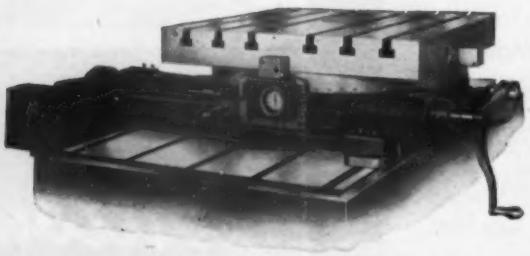


This big Ohio Horizontal (extra heavy duty, floor type) handled all the boring, drilling and milling operations on a 22000-pound cast steel base for a power shovel. Performance was accurate, speedy and completely satisfactory. Get new Bulletin 1000.



Ohio Horizontal extra heavy duty Boring, Drilling and Milling Machine (floor type) bores steel bed frame of 8" Ajax Forging Machine for crankshaft bearing sleeves. Work done fast, accurately, profitably. Get new Bulletin 1000.

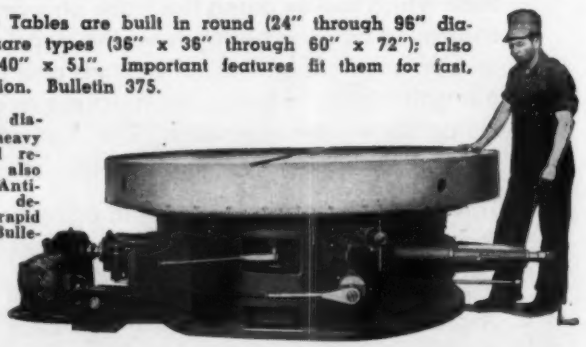
OHIO ROUND AND SQUARE REVOLVING TABLES

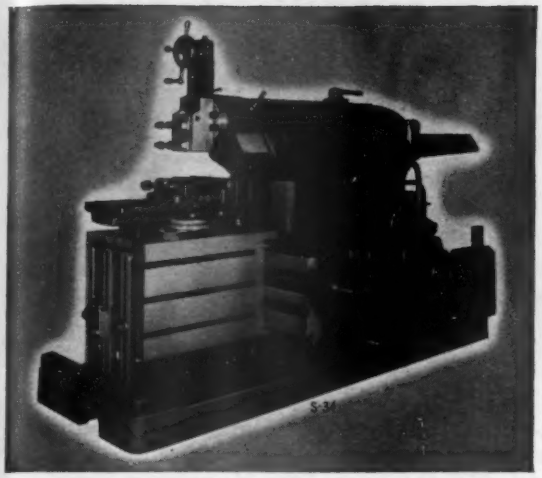


Above: 36" square worm feed revolving table with precision dial and 4 adjustable stops, anti-friction raising device and power rapid traverse with push-button control. Bulletin 375.

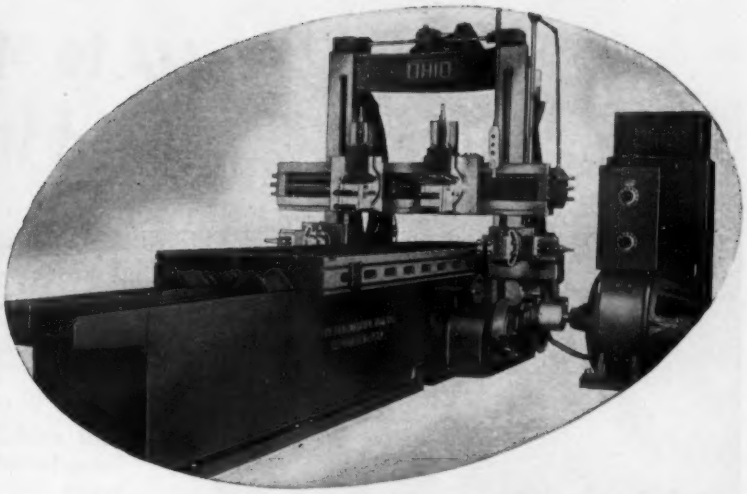
Ohio Revolving Tables are built in round (24" through 96" diameter) and square types (36" x 36" through 60" x 72"); also universal unit 40" x 51". Important features fit them for fast, modern production. Bulletin 375.

At right: 96" diameter extra heavy duty worm feed revolving table; also 72" and 84". Anti-friction raising device. Power rapid traverse. . . . Bulletin 375.



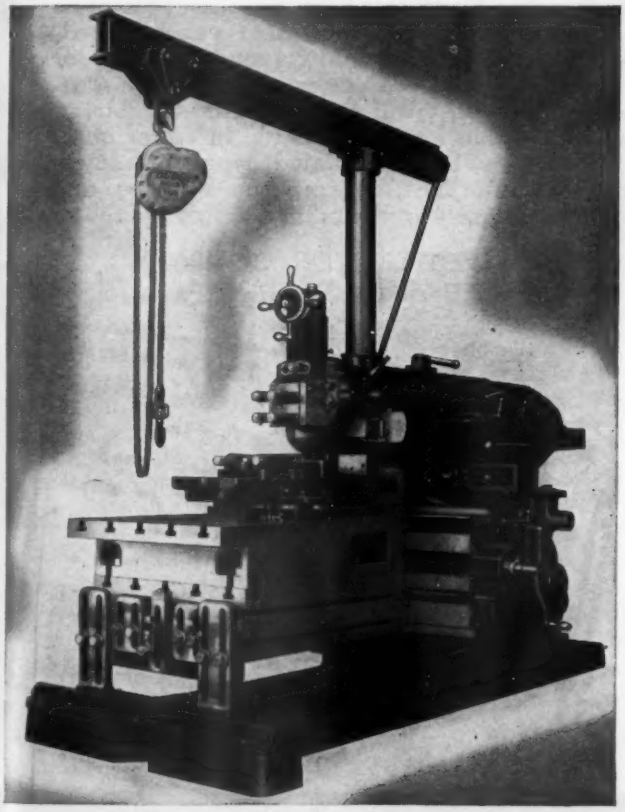


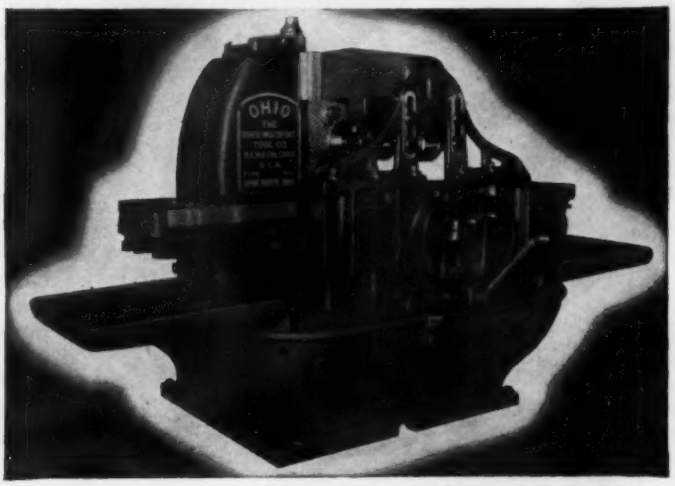
Above: Ohio Dreadnaught Shapers are built in 16" to 36" sizes, with a complete range of specifications. Get Bulletin 59.



Above: Ohio Planers, double-housing type, standard and heavy duty models, are furnished in sizes 24" x 24" through 48" x 42" in five types of drive. Get Bulletin 500.

Below: The Ohio Super Dreadnaught Shaper shown below is suited particularly to troublesome, large, odd-sized jobs. Table, 30" x 48". Ram bearing in column, 56" x 15". Length of ram without head, 80". Long ram allows 36" of stroke at any position on table or if job projects beyond front of table. Maximum distance from drop table (when furnished) to ram, 30". Weight of standard machine, 13400 lbs. Complete range of standard accessories available, especially attachments for railroad work. Bulletin 59.





Above: The Ohio Production Milling Machine, convenient and accessible, is profitable on both short and long runs. Get Bulletin 400.

★ ★ ★

In 1930 The Ohio Machine Tool Company announced the first all-friction horizontal boring mill built on the American continent. This is typical of the advanced design we have sought to embody in our lines since 1887. The Ohio staff has long been schooled to anticipate increasing demands in cutting tool capacity and accuracy. Today, with a dual emphasis on quantity and quality, the performance of Ohio Machine Tools in steel mills, arsenals, navy yards and other phases of war production is evidence of Ohio efficiency and long life.

THE OHIO MACHINE TOOL COMPANY

KENTUCKY, OHIO, U.S.A.

OHIO DREADNAUGHT

HORIZONTAL BORING, DRILLING AND MILLING MACHINES • SHAPERS • PLANERS

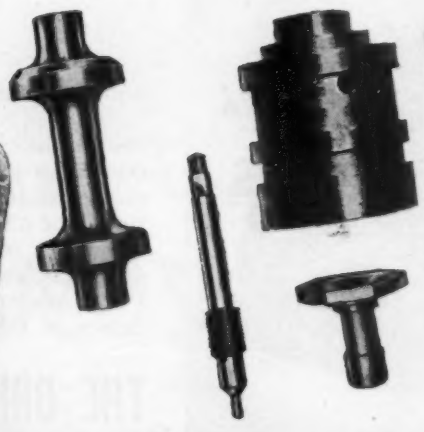
Here's how to speed output of parts machined from Stainless Steel

Free-Machining Stainless Invented by Carpenter, Can Help to Relieve Wartime Production Pressure in Your Shop

The usefulness of Stainless Steel has been greatly broadened since Carpenter's introduction of Stainless types 416 and 303, the basic Free-Machining Stainless Steels. Today, Free-Machining Stainless Steels can be used for any machining job. Cutting speeds as high as 120 to 200 surface feet per minute speed this Stainless down the production line. The free-machining qualities make for freer and cleaner cutting to close tolerances by causing the chips to skid off the nose of the tool and thus prevent "bugging". Furthermore, these grades grind and polish as easily as they cut, since fine chips don't tend to load the abrasive.

On these pages we provide information on two of the most widely used Carpenter Free-Machining Stainless Steels. For jobs where severe corrosion is encountered, Carpenter Stainless No. 8 grade is recommended; for jobs requiring less severe corrosion resistance, Carpenter Stainless No. 5 will provide easier machining and make possible lower unit costs. In either case, you'll find these Free-Machining types absolutely uniform, bar after bar, in corrosion resisting and physical properties—in easier machining qualities.

THE CARPENTER STEEL COMPANY
109 W. Bern St., Reading, Pa.



***Apply* these Advantages of Free-Machining Stainless in Your Shop**

- Faster cutting speeds
- Less bugging or welding of chips
- Better finishes
- Closer tolerances
- Less spoiled work
- Less tool trouble
- Less galling or seizing

Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

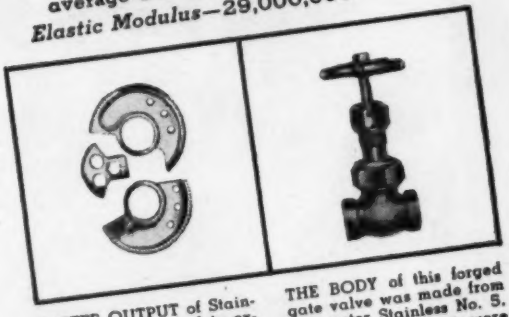
For Easiest Machining of a Straight Chrome Stainless

Carpenter Stainless No. 5—Type 416

This was the first Free-Machining Stainless Steel ever made—and it is still the most widely used. Carpenter Stainless No. 5 is used for making shafts, axles, gears, pinions, in machines, instruments, other appliances; also valve trim, bolts and nuts—in fact in any part requiring considerable machine work. It performs in automatic screw machines about like SAE 1120 and cutting speeds between 125 and 200 surface feet per minute are common. The anti-friction properties of this Stainless help to prevent galling and seizing, and scratching from all sorts of metal-to-metal contacts. No. 5 is recommended to resist atmosphere, fresh water, mine water, steam, carbonic acid, gasoline, crude oil, blood, perspiration, alcohol, ammonia, soap, sugar and sugar solutions and most foodstuffs. Where extra corrosion resistance is needed in a Free-Machining Stainless, No. 8 is recommended. It is furnished almost exclusively in forging billets and bars, hot rolled bars, cold drawn bars, centerless ground bars and polished shafting.

Physical Properties of Carpenter Stainless No. 5
Type 416—(Carbon .10%—Chromium 13.50%—Sulphur .30%)

Tensile Strength—80,000 to 164,000 lbs. per sq. in.
Specific Gravity—7.77
Melting Point—About 2525° F.
Specific Heat—.11
Thermal Conductivity—.059 C.G.S. units at 100 deg. C.
Coefficient Thermal Expansion—.000006: average 60° F. to 1500° F.
Elastic Modulus—29,000,000



FASTER OUTPUT of Stainless parts machined to exceptionally close tolerances, such as these gear segments, is possible when Carpenter Stainless No. 5 is used.

THE BODY of this forged gate valve was made from Carpenter Stainless No. 5. Stem, bonnet and nuts were economically machined from No. 5 bar stock.

For Easiest Machining in an 18-8 Stainless

Carpenter Stainless No. 8—Type 303

This Stainless is a Free-Machining 18-8 chrome-nickel steel, used for automatic screw machine parts, valve parts, aircraft engine parts, etc. This Stainless is so freely machinable that it can readily be handled on automatic screw machines at about 70% of the speed of SAE 1120. No. 8 resists rusting from all atmospheric sources and is recommended for use in connection with foodstuffs, sterilizing solutions, most of the organic chemicals and dyestuffs, and a wide variety of inorganic chemicals. This Stainless is easy to grind or polish. It is furnished almost exclusively in forging billets and bars, hot rolled bars, cold drawn bars, centerless ground bars and polished shafting.

Note! The physical properties of all grades of Stainless Steel depend upon form, heat treatment or cold working. Wider ranges of properties are available in certain forms. Take up your special problems with our representative.

Physical Properties of Carpenter Stainless No. 8
Type 303—(Carbon .10%—Chromium 18.00%—Nickel 8.00%—Selenium .25%)

Tensile Strength—85,000 to 150,000 lbs. per sq. in.
Specific Gravity—7.93
Melting Point—Approximately 2550° F.
Specific Heat—.12
Thermal Conductivity—.037 C.G.S. units at 100 deg. C.
Coefficient Thermal Expansion—.0000095 average 68° F. to 1500° F.
(This is about 50% higher than mild steel, or the simple chromium Stainless Steels.)
Magnetic Properties—Non-magnetic unless work-hardened when it becomes slightly magnetic.
Permeability—As annealed 1.003 max.
Elastic Modulus—29,000,000

SMALL screw machine parts like these must be kept to extremely close tolerances. Carpenter Stainless No. 8 will do the job quickly and easily.

CORROSION resisting parts in this dew point tester cost less to machine when they are made from Carpenter Stainless No. 8.

...for
- Strength
- Rigidity
- Heat Resistance
- Corrosion Resistance
- Longer Product Life
- Sales Appeal

For best results in machining Stainless parts it will pay you to call in your nearby Carpenter representative. He has had broad experience in applying Free-Machining Stainless Steels to the problems of other Stainless users. Call on him or write us at the mill, regarding your requirements.

TOOL ROOM PRECISION ON WAR PRODUCTION

● Adaptability to a wide range of work —ability to maintain extreme precision demands—the fine finish obtained are three good reasons for Sidney Tool Room Lathes being used so extensively in arsenals—in aircraft plants—in contract work plants.

Sidney offers four sizes of Tool Room Lathes from 14" to 20" inclusive. They feature 16 speed continuous tooth Herringbone geared headstocks—48 feed changes from .0027" to .172"—48 thread changes 1½ to 92—forced feed lubrication and anti-friction bearings throughout.

Illustrated is a Sidney Lathe working on ordnance materiel. *Bulletins available.*

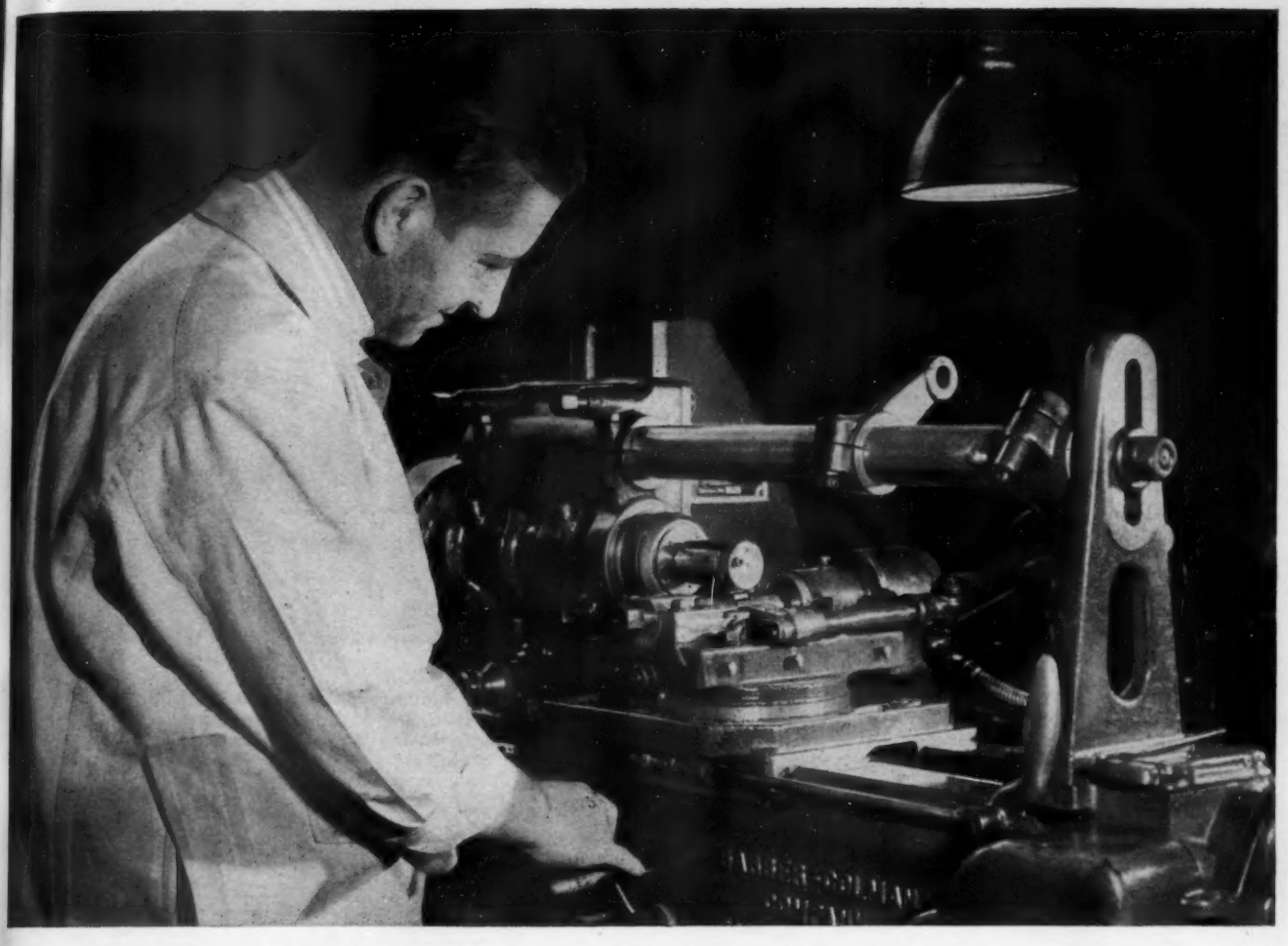
Sidney Lathes

SIDNEY

The **SIDNEY MACHINE TOOL** *Company*

Builders of Precision Machinery

SIDNEY ESTABLISHED 1904 OHIO



B-C NO. 3 HOBBING MACHINE CUTS HIGH PRECISION INSTRUMENT SECTORS

THOSE of you who are hobbing fine pitch work will be interested in the extreme accuracy obtained on this sector gear, using a standard Barber-Colman No. 3 Hobbing Machine. The sector has 53 teeth, 180 diametral pitch (318 teeth in full circle), and pitch diameter of 1.759″. The length of the segment is .8750″. A special Barber-Colman ground topping hob is used. The only special preparations on this job are a periodic check to maintain the work-spindle running true, and the use of a special arbor and clamping fixture which can be adjusted to run true within .0001″. Ten blanks are hobbed at a time in the special chuck as shown above. A very fine finish is required and a feed of .0085″ per revolution of work is used. Hob speed is 309 R.P.M., and average floor-to-floor time for cutting one load is 30 minutes. An important feature of this job is that while only a sector is being hobbed, the accuracy of the pitch line and O.D. is held within .0003″ runout. This customer is long experienced in fine workmanship, and this is only one example of several types of work of comparable accuracy being hobbed on Barber-Colman equipment in their plant. If you have work requiring this degree of accuracy and finish, we recommend Barber-Colman Hobbing Machines and Fine Pitch Hobs. Write for Circular E-812.

WRITE FOR CIRCULAR.:

Buy War Bonds

BARBER B-C COLMAN PRODUCTS: HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

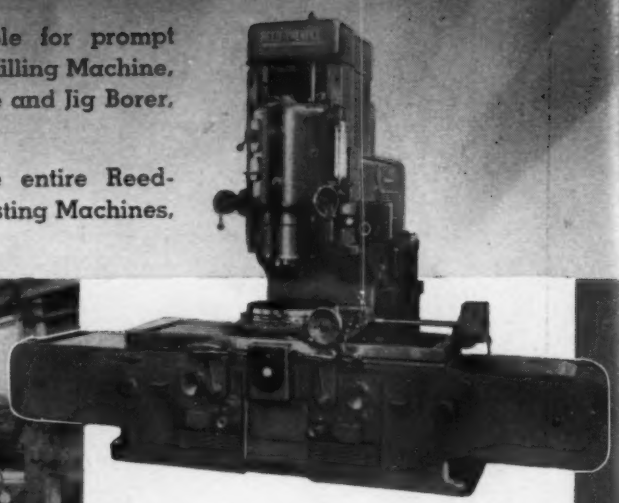
Barber-Colman Company

GENERAL OFFICES AND PLANT • 111 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

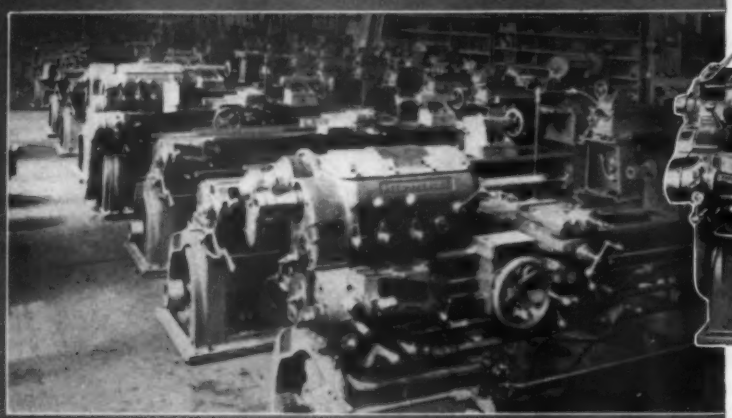
READY— TO WORK FOR YOU!

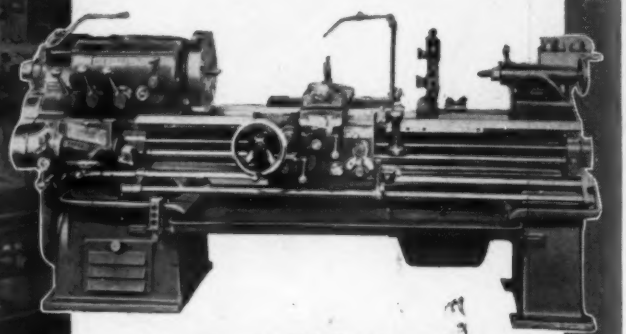
The machines shown below are available for prompt delivery as are also the Reed-Prentice No. 3VG Milling Machine, table size 10¼" x 36", the No. 5 Milling Machine and Jig Borer, table size 68" x 16".

We solicit your inquiries relative to the entire Reed-Prentice line of Milling Machines, Lathes, Die Casting Machines, and Plastic Injection Molding Machines.

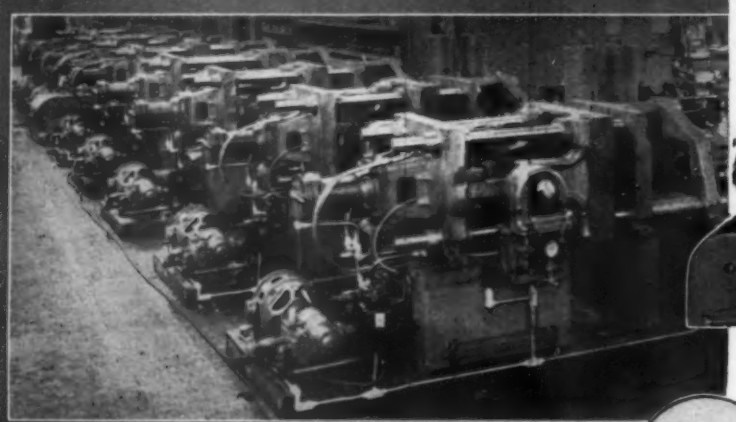


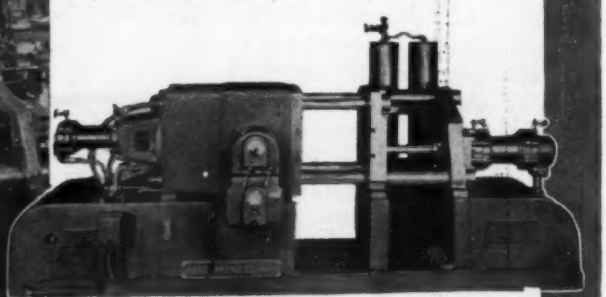
No. 4 Milling Machine, table 24"x84" driven by hydraulically actuated screws. Infinitely variable feeds to table, cross slide and head.





14", 16" and 20" Engine and Precision Toolroom Lathes. Sliding Head; bed lengths from 30" in increments of 24".





1½G Die Casting Machine for Brass, Aluminum and Magnesium, weight, 11,250 pounds. Write for details of our complete service including die design and construction.

BRANCH OFFICES
1213 W. 3rd. St.
Cleveland, Ohio
75 West St.
New York City, N. Y.

REED-PRENTICE CORP.

MAIN OFFICE
WORCESTER
MASS. U. S. A.

One More Shadow on the Rising Sun

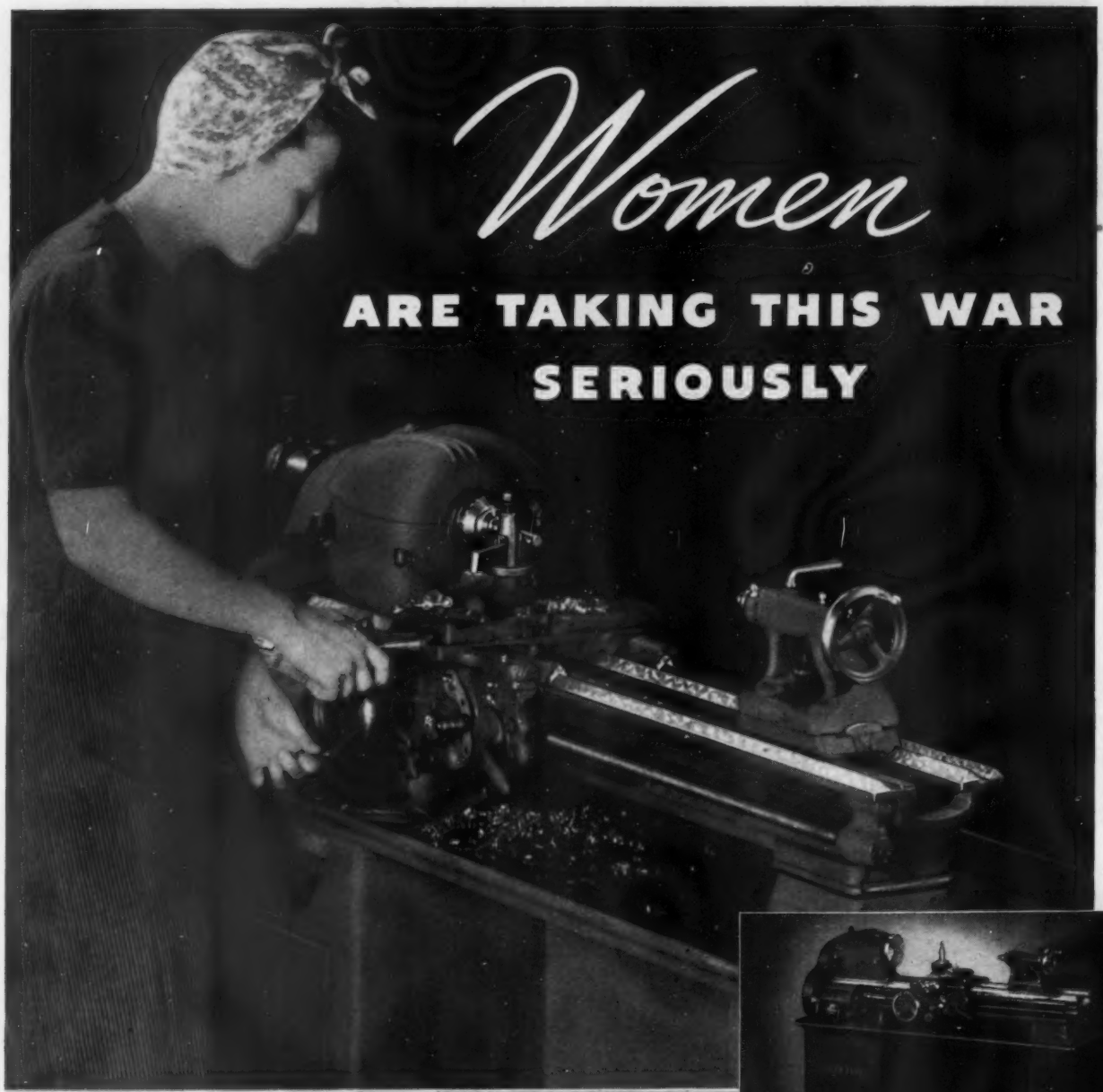
TINY though it is, this particular Pratt & Whitney tap landed on Guadalcanal with the Marines . . . and saved American lives! Right under Jap positions this tap cut a new thread that kept a Marine's gun firing . . . and you know what happened. That Pratt & Whitney tap was part of American regular fighting equipment, and it proved as important as bullets. Do you blame us for being proud?

Our men make many thousands of taps at Pratt & Whitney without always knowing where they will be used. All kinds and sizes . . . standard and special . . . go through these skilled hands day and night. Yet each tap receives individual attention, from bar steel to final inspection. Pratt & Whitney taps play a big part in war production . . . our men will not knowingly pass any but the best. They know that many of them, like this tap from Guadalcanal, are in the hands of American fighters in every corner of the world . . . chosen because of outstanding Pratt & Whitney quality and performance. We will not violate that trust.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD • CONNECTICUT



SOUTH BEND LATHES

9" swing, South Bend Engine Lathe

With grim determination thousands of American women are doing their best to fill men's shoes. Eagerly they bend their shoulders to wartime tasks—for no sacrifice is too great if it hastens the return of their men from the fighting fronts.

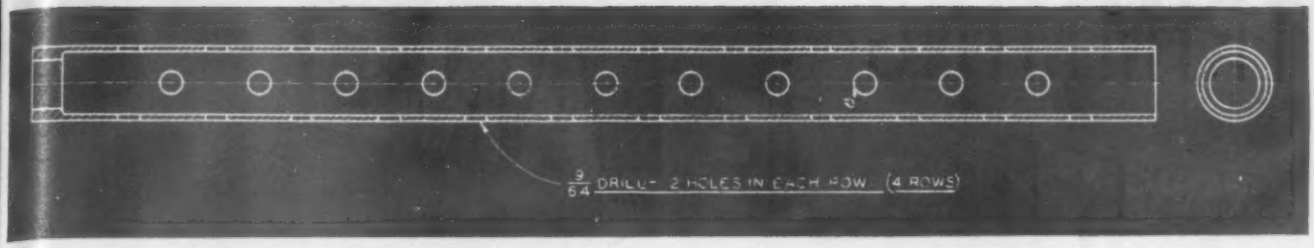
In hundreds of vital war plants, women are operating South Bend Lathes with surprising results. On all kinds of jobs, they have kept up production and maintained established standards of precision. In some factories whole batteries of South Bend Lathes are humming under the guidance of feminine hands.

Since World War I, women operators have preferred South Bend Lathes. Their nimble fingers find the convenient controls well suited to their sensitive touch. They like the fully enclosed design. And, most of all, they appreciate the ease of operation that prevents fatigue and makes the workday seem shorter.

South Bend Engine Lathes and Toolroom Lathes are made in five sizes: 9″ to 16″ swings, with 3′ to 12′ bed lengths. The Turret Lathes are made with 9″ and 10″ swings. Write for Catalog 100C which describes all sizes and types of South Bend Lathes.

BUY WAR BONDS

SOUTH BEND LATHE WORKS Lathe Builders for 37 Years
SOUTH BEND 22, INDIANA



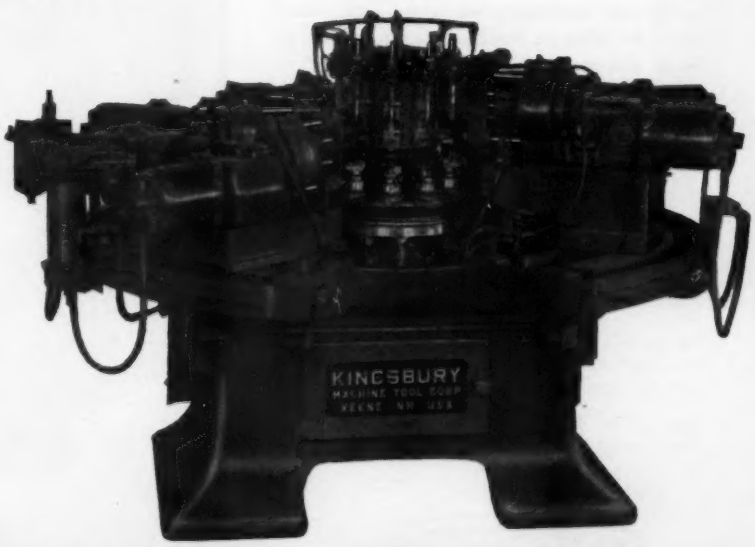
A FLEXIMATIC

by KINGSBURY

JOB ... SPEEDING NAVAL ORDNANCE PRODUCTION!

When the call came for machines capable of turning out munitions and aircraft parts at mass-production speeds, Kingsbury FLEXIMATICS were ready! Quickly made up of standard units mounted on standard bases. FLEXIMATICS can perform drilling, tapping, reaming and many other operations in **any** position or at **any** angle on **any** part that can be chucked. For example, all 48 holes are produced in the flash tube shown above in a single chucking of the work. Each work holder on the main turret is in itself a turret which indexes as the main turret indexes, thus enabling the rows of holes to be drilled at four positions on the tube without removing the work. Various lengths of tube can be handled by the machine by adjusting the position of the top clamping member.

Speeding war production by making it possible for semi-skilled labor to turn out large volumes of precision parts, Kingsbury FLEXIMATICS possess the added advantage of FLEXIBILITY that permits quick, easy changeovers to meet changes in design or machining requirements.



KINGSBURY MACHINE TOOL CORPORATION

KEENE NEW HAMPSHIRE U S A

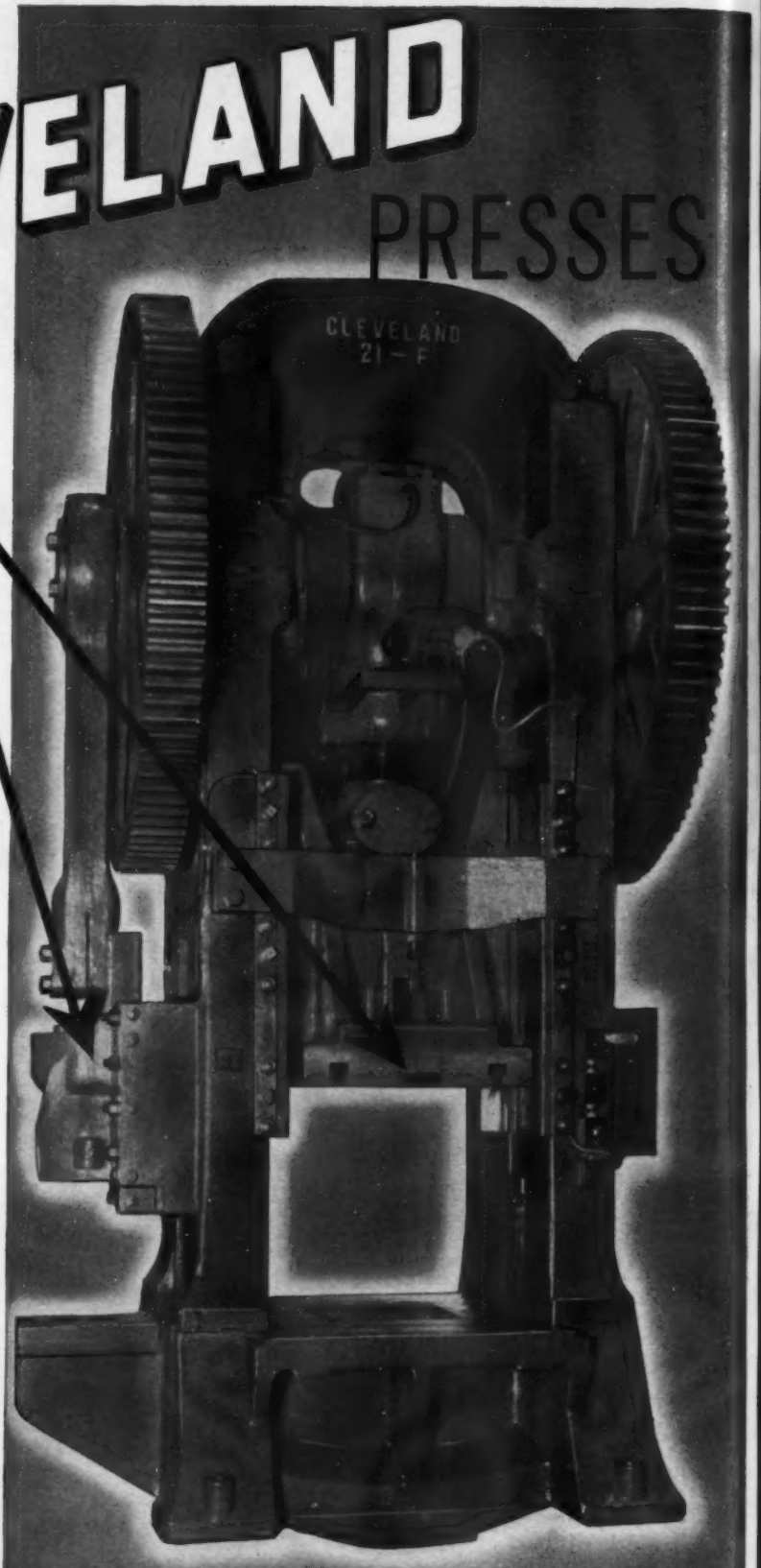
TRIMMING CLEVELAND PRESSES

WITH

INNER

AND

OUTER SLIDES



While Cleveland Trimming Presses have, in normal times, been used extensively in the production of automobile parts, agricultural implements and general hardware, the needs of war have demonstrated that their use is by no means confined to these particular industries as their design lends itself to the production of a great many other products.

The inner slide, which is usually designed with a large flange having a dovetail running from front to back for the accommodation of the dies, is of massive construction and, as will be noted from the illustration, it is provided with extra long ways and gibs which keep the slide in alignment even at the extreme end of its stroke.

The outer slide, which may be used for punching, cutting off, trimming or piercing, is carried in well fitted gibs and has a screw adjustment to allow for the various heights of dies and also to take up wear. Cleveland Straight Sided Trimming Presses can be furnished in either single or double crank in sizes to suit particular requirements.

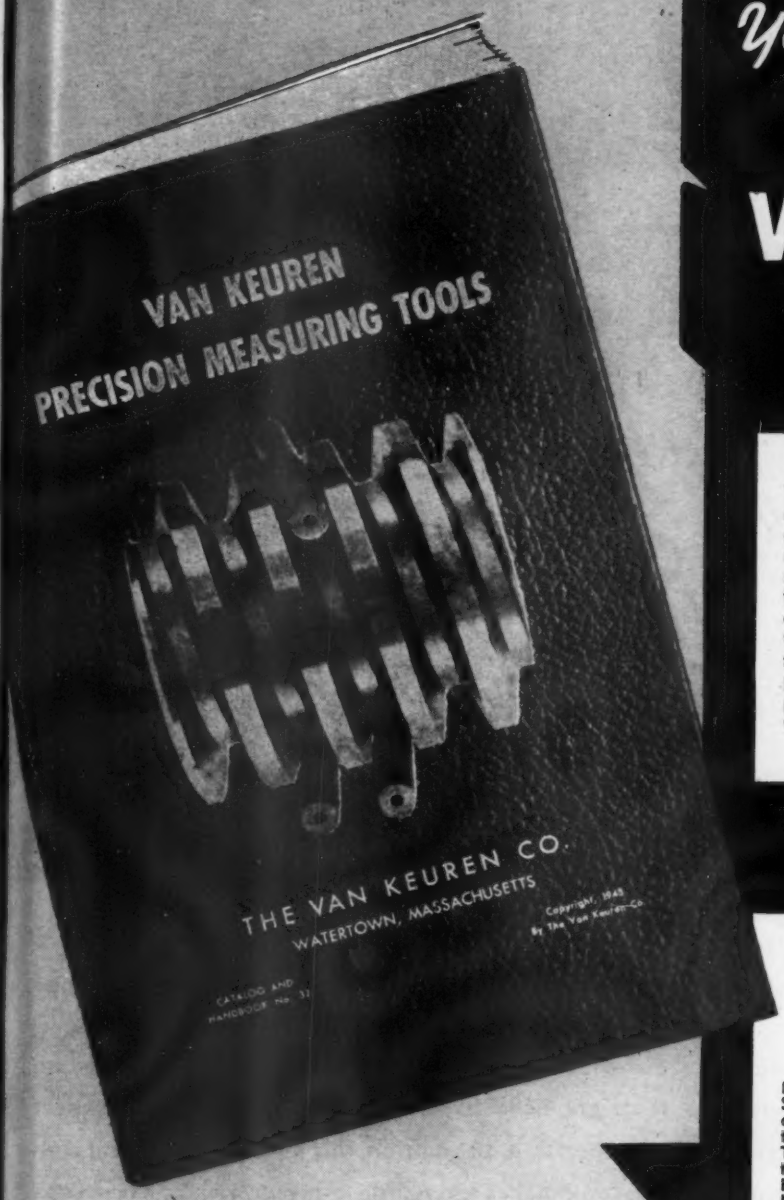
The illustration shows a Cleveland 21" F Single Crank Press the inner slide of which has a capacity of 500 tons. Other sizes include:

Size	9F	10F	11F	12F	14F	15F	16F	18F	22F
Tons	75	90	110	130	180	215	255	345	600

THE CLEVELAND PUNCH & SHEAR WK'S CO. U. S. A.

THE CLEVELAND PUNCH & SHEAR WORKS CO. CLEVELAND · OHIO

Just off the Press!



Your Personal Copy of the NEW VAN KEUREN HANDBOOK No. 32

This new 144 page Catalog and Handbook is a highly useful manual in convenient reference form on precision measuring. It describes and illustrates methods and equipment for checking accuracy to hundred thousandths and millionths of an inch. Use of the Van Keuren equipment described in this new booklet has resulted in many outstanding improvements in production and product quality and in vastly simplifying the problem of attaining closest tolerances on work of all kinds.

Partial List of Contents

NEW PRODUCTS

New Light Wave Equipment with fused quartz optical flats.
New solid square master blocks representing permanent accuracy.
New and complete gear measuring tables from 5 to 500 teeth.

ENGINEERING INFORMATION

How to measure standard and special screw threads.
Screw thread data includng tables of basic diameters and tap drill sizes for all American threads.
Thread proportions for American and Foreign threads.
Bureau of Standards measuring wire specifications.
How to measure helical gears.
How to measure angles.
How to use optical flats.
Notes on gaging holes.

Mail Coupon TODAY!

THE Van Keuren CO., 176 WALTHAM ST., WATERTOWN, MASS.

25th Year

Ultimate Accuracy

THE VAN KEUREN CO., 176 WALTHAM STREET, WATERTOWN, MASS.

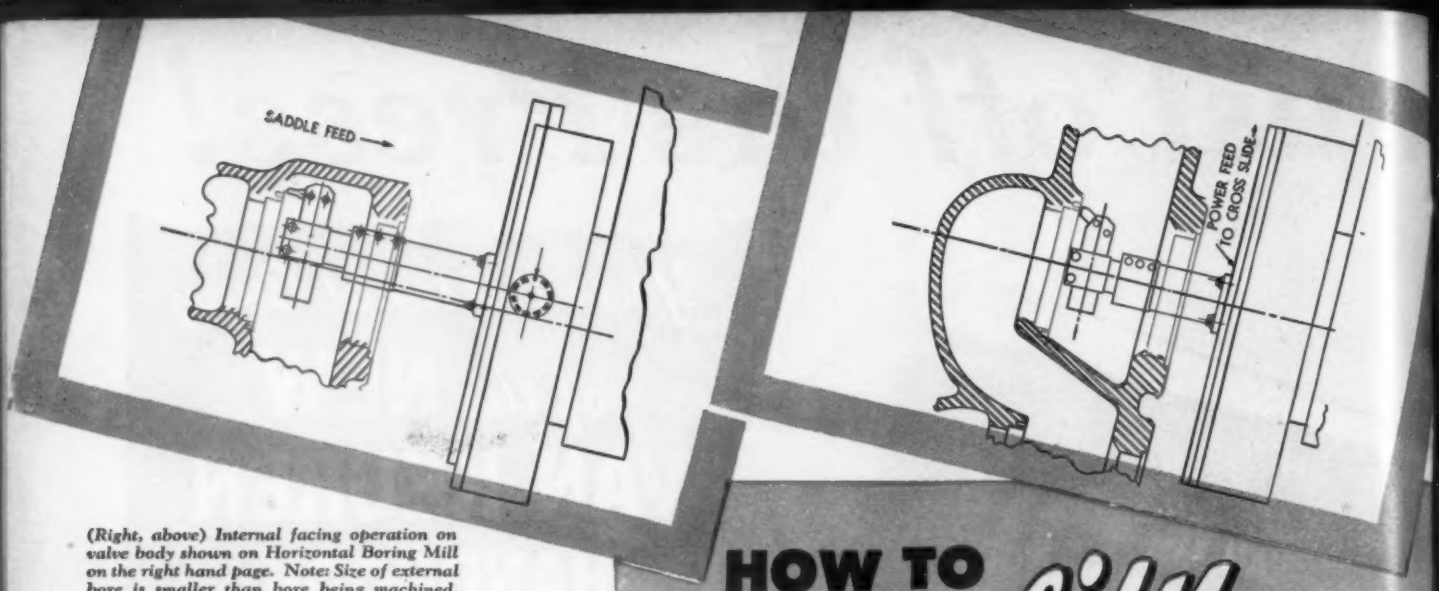
Kindly send me a copy of your NEW Catalog No. 32. It is understood this request incurs no obligation on my part.

Name .....

Position .....

Company .....

Address .....



*(Right, above) Internal facing operation on valve body shown on Horizontal Boring Mill on the right hand page. Note: Size of external bore is smaller than bore being machined. The continuous feed facing head feeds the tool outward.**

*(Above) Grooving operation being performed in blind bore of same valve body shown on machine on right hand page. Tool slide is adjusted until tool enters smaller external bore, then set out to proper groove diameter by using micrometer dial. Saddle feed is then engaged for grooving.**

**Note: All operations shown in red in both views are performed in the same setup by merely changing tool bits.*

HOW TO *simplify internal operations* LIKE THESE

Increase the Versatility of Your Horizontal Boring Mill with a G. & L. Boring and Facing Head

Internal boring, facing and counter-boring in open or blind holes where bores are larger than openings, are easily performed on G. & L. Boring Mills, equipped with the G. & L. Continuous Feed Facing and Boring Head. In this particular installation, the manufacturer was confronted with the problem of boring intricate valve bodies with many external and internal machining operations. His G. & L. Table Type Machine, equipped with a 26″ diameter Continuous Feed Facing and Boring Head, makes it possible for him to perform all of these operations on one machine. Since the spindle extends through the facing head, the facing head need not be removed for milling, drilling, or boring operations which require the tools or boring bars to be mounted directly in the morse taper of the spindle.

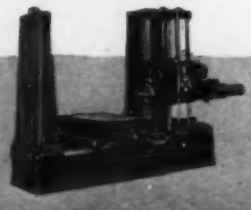
Perhaps you have unusual jobs for your horizontal boring, drilling and milling machine that can be simplified with this attachment. The five features described on the right hand page make for easy, rapid adjustment and operation. In addition, this unusual design and construction makes it possible to perform many operations and combinations of operations not ordinarily performed with a horizontal boring, drilling and milling machine. On occasion, it has been used for threading, and can be used for boring and facing simultaneously.

A wide range of standard tools is available for use with this attachment. Special tools can be designed and built for specific applications.

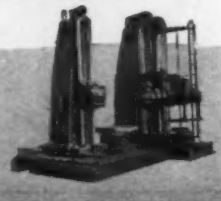
G&L

GIDDINGS & LEWIS

138 DOTY STREET



Right: G. & L. Table Type Machine.



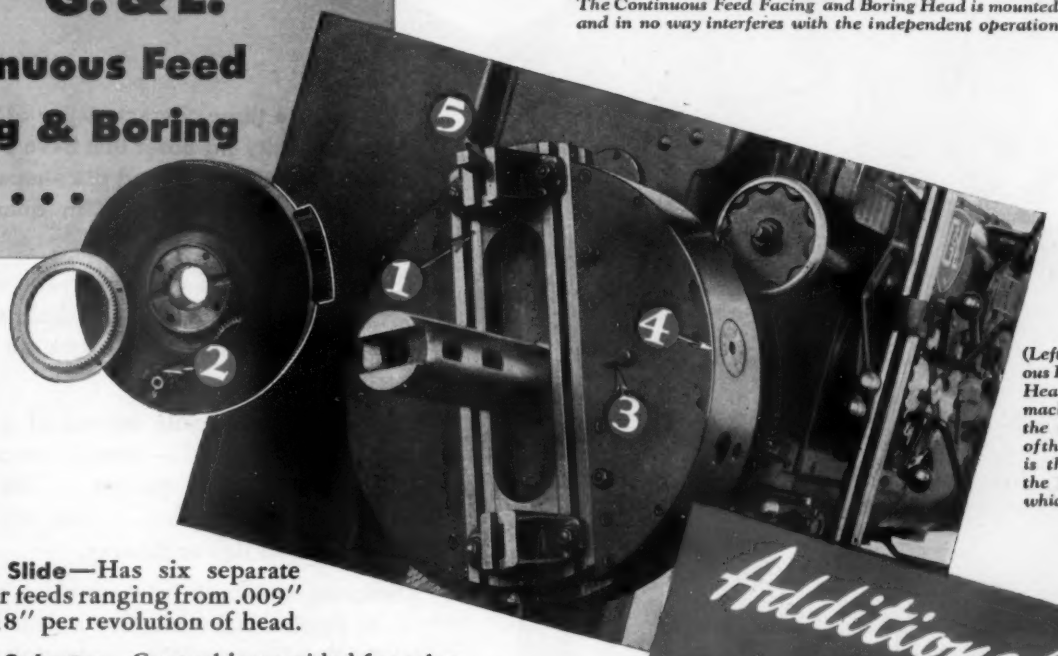
Right: G. & L. Floor Type Machine.

(Above) *View showing boring operation on valve bodies using main spindle. The Continuous Feed Facing and Boring Head is mounted on the machine and in no way interferes with the independent operation of the spindle.*

. . . Reduce Settings and Save Time

with this

G. & L. Continuous Feed Facing & Boring Head . . .

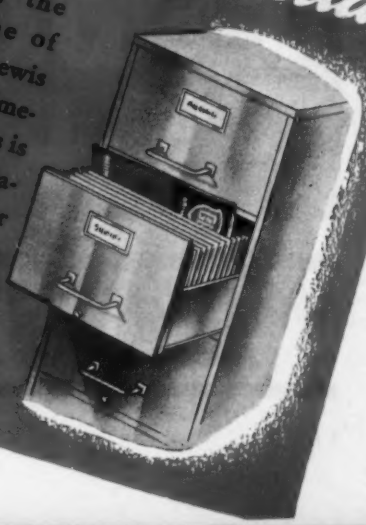


(Left) *The G. & L. Continuous Feed Facing and Boring Head with main spindle of the machine extended through the hardened steel bushing of the attachment. Also shown is the driving method and the stationary flanged gear which drives the feed train.*

1. **Tool Slide**—Has six separate power feeds ranging from .009" to .118" per revolution of head.
2. **Feed Selector**—Control is provided for selection of any one of six feeds.
3. **Directional Control**—Lever points in direction of tool slide feed.
4. **Micrometer Adjustment**—Graduated to .001" for tool slide adjustment.
5. **Two Tool Holders** with ¾" tool bits furnished as standard equipment.

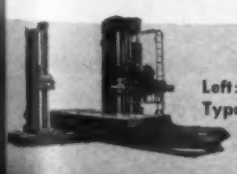
Additional Data

. . . covering the complete line of Giddings and Lewis machines and time-saving accessories is included in this catalog. Write for your copy today—please indicate your business connection. Ask for Bulletin AM24.

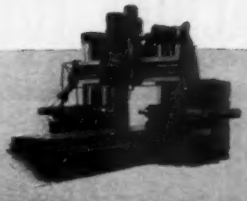


MACHINE TOOL CO.

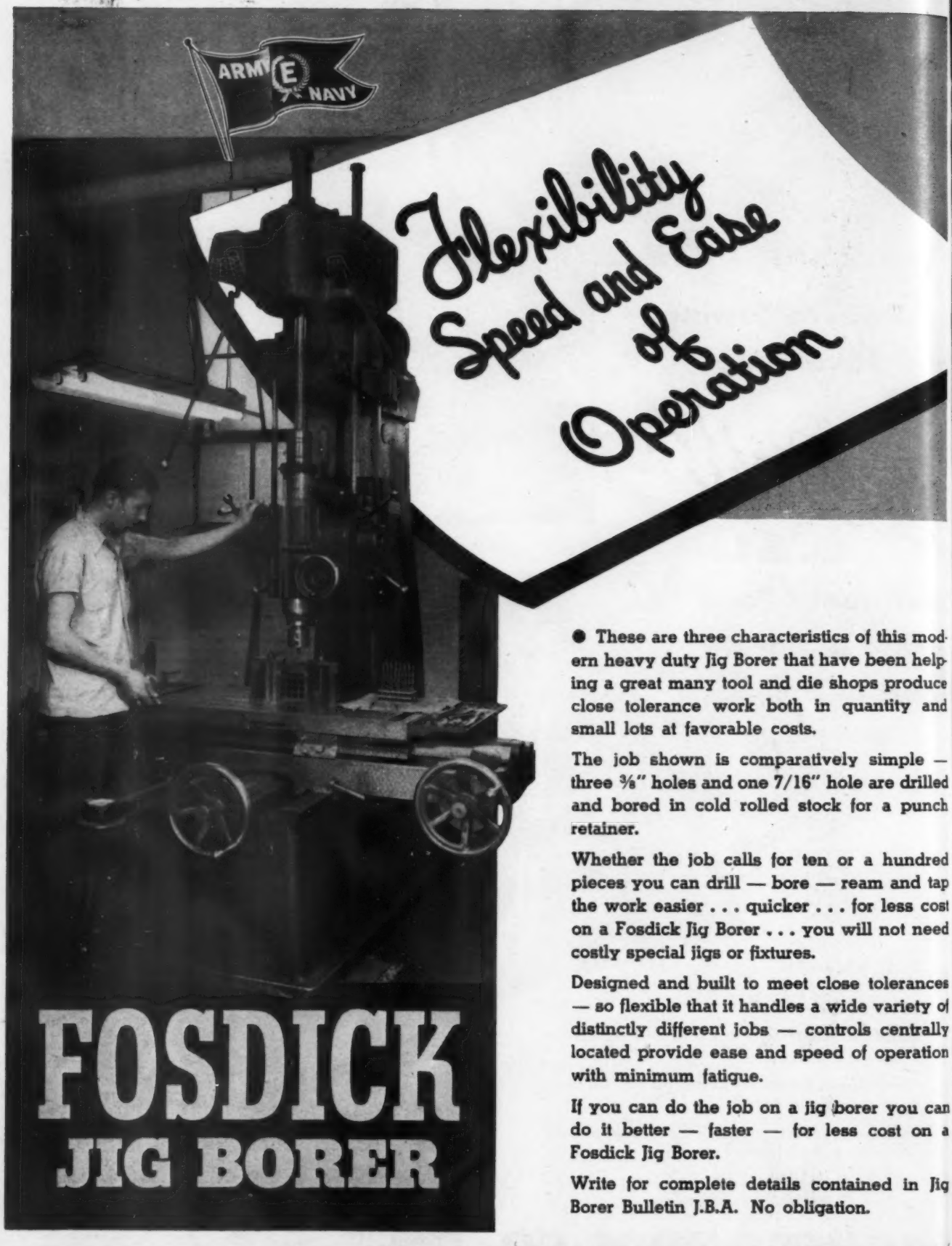
OND DU LAC, WIS.



Left: G. & L. Planer Type Machine.



Left: G. & L. Multiple Head Type Machine.



● These are three characteristics of this modern heavy duty Jig Borer that have been helping a great many tool and die shops produce close tolerance work both in quantity and small lots at favorable costs.

The job shown is comparatively simple — three ⅜" holes and one 7/16" hole are drilled and bored in cold rolled stock for a punch retainer.

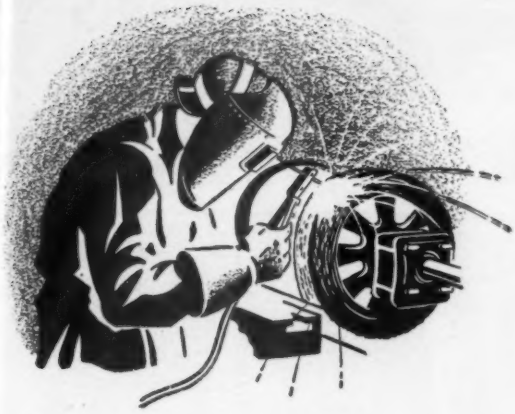
Whether the job calls for ten or a hundred pieces you can drill — bore — ream and tap the work easier . . . quicker . . . for less cost on a Fosdick Jig Borer . . . you will not need costly special jigs or fixtures.

Designed and built to meet close tolerances — so flexible that it handles a wide variety of distinctly different jobs — controls centrally located provide ease and speed of operation with minimum fatigue.

If you can do the job on a jig borer you can do it better — faster — for less cost on a Fosdick Jig Borer.

Write for complete details contained in Jig Borer Bulletin J.B.A. No obligation.

FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, · · · OHIO



Like automobile tires, mine locomotive wheels wear out. New wheels are hard to get, expensive, require critical steel.

"Retreading" ... WITH STEEL

By welding layers of steel to the worn wheel, then machining this "retread" to the standard tire contour, badly worn locomotive tires—and axles too—can be reclaimed.

Wartime steel shortages, and the pressing need to keep equipment running, has greatly increased the need for this maintenance service.

Westinghouse District *Manufacturing & Repair** Plants in the nation's coal mining areas have more than doubled their facilities for handling this vital emergency service.

Every Westinghouse M & R Plant is a part of a nationwide service organization—with local branches as close as your telephone. Factory trained men, using factory methods and equipment, are ready to give you complete, dependable repair service on any type of electrical equipment. J-90501

When vital electrical equipment needs repair ... phone the nearest office of Westinghouse Electric and Manufacturing Company for

Westinghouse

PLANTS IN 25 CITIES ... OFFICES EVERYWHERE

COMPLETE REPAIR SERVICE

*33 M & R PLANTS • • ONE NEAR YOU

KING Vertical Boring & Turning Machine

● The KING Boring Mill shown machining clutch plates for Victory ship power transmissions was turning turret lathe saddles only a few weeks previous to the time this photo was taken.

This is a typical example of King versatility and also illustrates its capacity to produce close tolerance work and maintain accuracy on a wide range of boring—turning—and facing operations.

It also demonstrates the ease with which a King Vertical Boring & Turning Machine can be converted from one type of production to another and show a profit on both types of work.

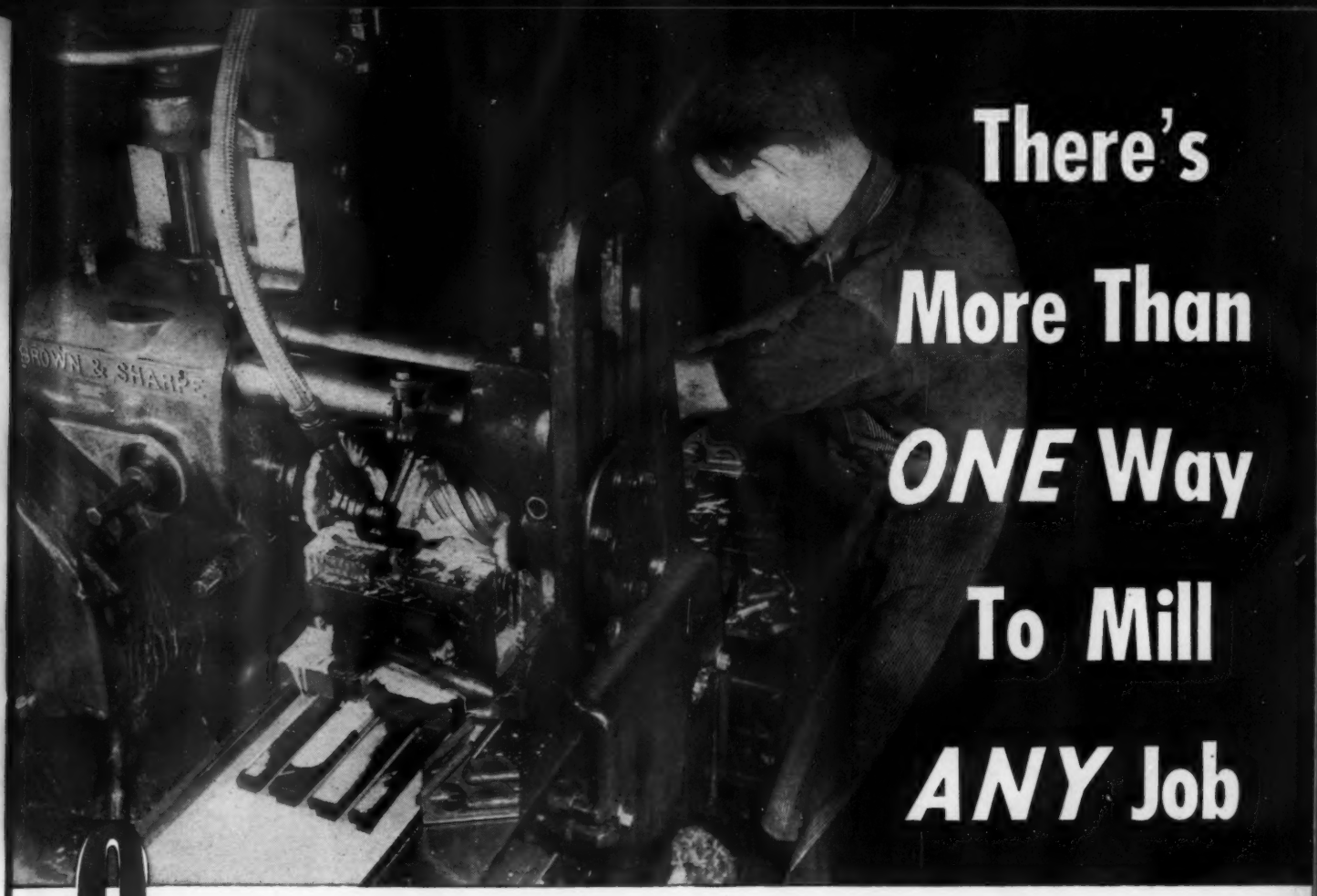
KING BUILDS—Vertical Boring and Turning Machines exclusively—single column types from 30" to 42", double column types up to 10 feet.

From Turret Lathe Saddles To Victory Ship Clutch Plates

The KING MACHINE TOOL Company

BUILDERS OF VERTICAL BORING AND TURNING MACHINES EXCLUSIVELY

CINCINNATI 32, OHIO, U.S.A.



There's More Than *ONE* Way To Mill *ANY* Job

On the № 12 you can do it the BEST way

ILLUSTRATION — Production jumped 27% when Dual Feed Rate was used on this double-fixture job employing an automatic cycle automaticaly repeated.

Also, on No. 12 Plain Milling Machines, Take Advantage of . . .

DUAL FEED RATE — Save on run-in. Reduce cutting time on work having varying stock depth.

ACCURACY OF TABLE CONTROL — Run in close to work in fast travel before dropping into feed; return to fast travel the instant cutter is clear of work. Make blind cuts with consistent accuracy.

Because Machine Provides Choice of These Methods

CONVENTIONAL MILLING — With speeds and feeds available to give maximum stock removal on all materials.

CLIMB MILLING — For those hard-to-hold jobs. Often permits use of higher feeds; with longer cutter life.

ROUGH-AND-FINISH MILLING — Rough by climb milling, finish by conventional milling as table returns — with only *one* chucking in *one* fixture. Ideal for formed cuts.

DOUBLE-FIXTURE MILLING— Employs an automatic cycle automatically repeated; eliminates loading time; requires only one set of cutters.

We are proud to be honored with the Navy "E", awarded for outstanding accomplishment in Defense production.
Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.

BROWN & SHARPE

Hydraulic feed and rapid traverse move the cutter head transversely on hardened and ground steel ways. A variety of work fixtures can be mounted on the bed.

CROSS SPECIAL *Floor Type Miller*

Cross' development of a Floor Type Miller with traversing head is of particular importance to the manufacturer who was forced to start quickly and at any expense by improvising with standard machine tools. With exceptional range and flexibility, it is constructed to handle a variety of work with little time required for changeover and set-up. The bed is arranged to receive many different kinds of holding fixtures—vertical, horizontal, angular, indexing, compound, rotary feed, rise and fall. The full automatic operating cycle is controlled from a central push button station and it can be set to automatically perform plain face milling, contour milling, profile milling, slotting, rotary milling, and operations requiring the cutter to traverse an irregular path.

The cutter spindle is mounted in a cradle which can be set to oscillate or rotate thru any predetermined arc. Oscillatory and transverse cutter movements may be synchronized to suit the work.

A review of current practice will reveal many opportunities to consolidate operations and put them on an automatic basis with improved accuracy and reduced manpower. Cross engineers are prepared to assist you in applying special machinery to your manufacturing problems.

CROSS GEAR & MACHINE CO.

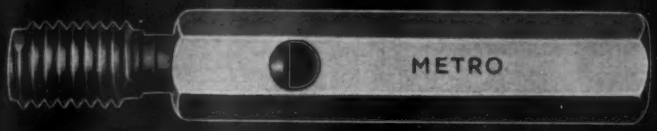
Established in 1898

DETROIT, MICHIGAN, U.S.A.

S-2

METRO

THREAD PLUG AND RING GAGES·····



Single End Go Style No. 910

Double End Go & Not Go Style No. 900

Single End Not Go Style No. 920

Immediate deliveries from Stock Sizes··National Coarse, Fine and Special Series·· A G D Standards

NO GO RING STYLE No. 810

GO RING STYLE No. 800

Ask for Catalog No. 101

GIVING COMPLETE DETAILS
ON THREAD PLUG GAGES
AND RING GAGES

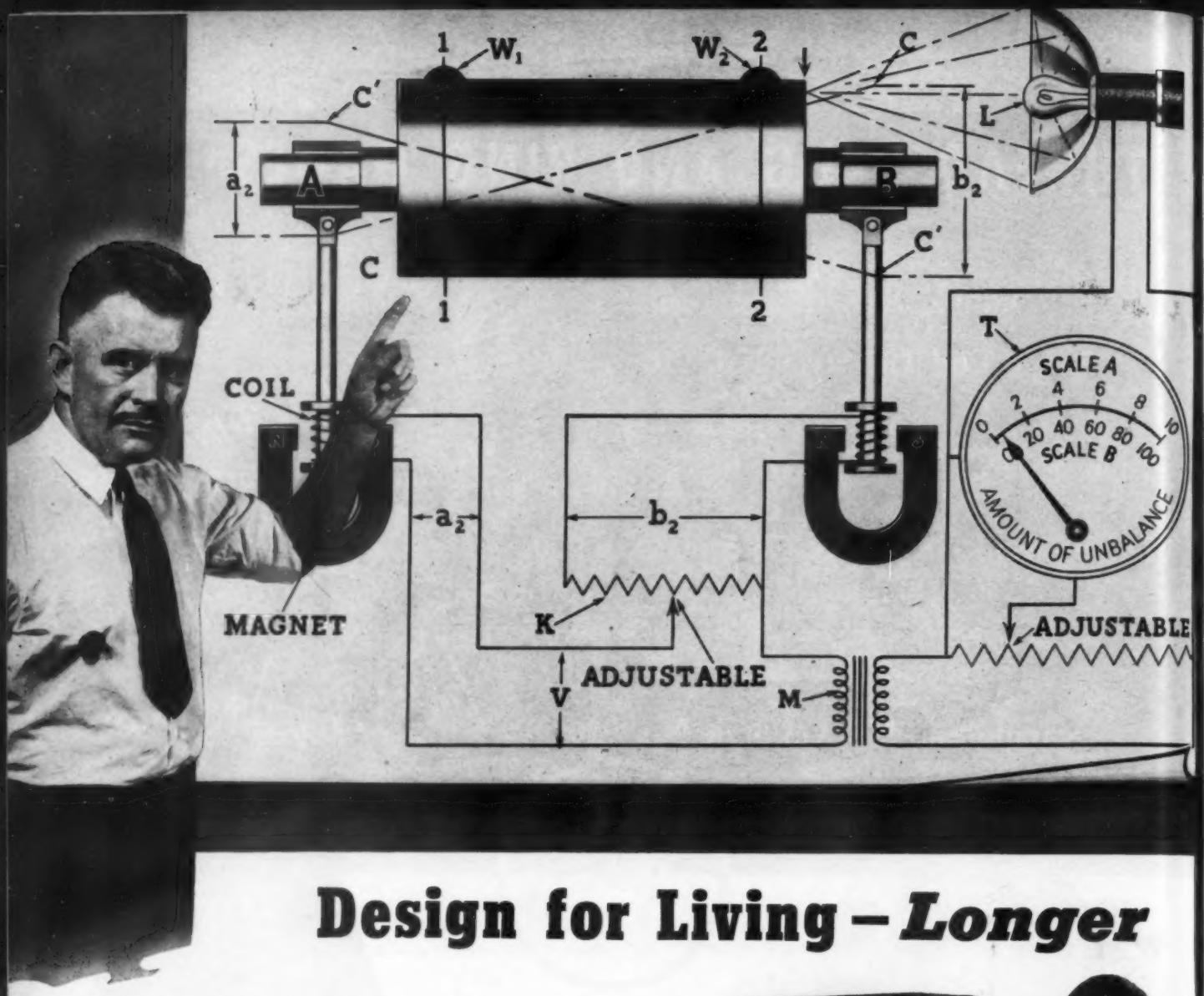
●

METRO BUILDS SPECIAL GAGES · · · ALL TYPES · · · TO YOUR SPECIFICATIONS

METRO

TOOL AND GAGE CO.

4240 PETERSON AVE.
CHICAGO, 30, ILL.



Design for Living – *Longer*

IF YOU'RE an electrical engineer, you'll see in this schematic diagram how the Gisholt Dynetric Balancing Machine *locates* and *measures* unbalanced forces by electrical means. If you aren't, don't let it bother you. Because the machine itself is so simplified that anyone can operate it.

The important thing is the way it can assure longer life in high speed rotating parts by eliminating vibration. It enables you to make accurate balance a *part of design* for smoother, more dependable operation. And it provides the quick and efficient means of insuring it. If your product involves the use of armatures, crankshafts, impellers, fans, pulleys, other high speed rotating parts, learn how Dynetric Balancing can help you.

GISHOLT MACHINE COMPANY
1201 East Washington Avenue • Madison 3, Wisconsin

LOOK AHEAD... KEEP AHEAD...
WITH GISHOLT IMPROVEMENTS

URRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

HERE'S WHY

Westinghouse Gearmotors

MEET YOUR POSTWAR DESIGN PROBLEMS TODAY

COMPACT—EASY TO MAINTAIN

Smooth, functional design of the new Westinghouse Gearmotor blends with modern machinery in any application. Gear case is split horizontally at shaft centers for easy inspection and maintenance.

NO "IF'S" ABOUT LUBRICATION

Gears and bearings are thoroughly lubricated by a positive splashing system. New gearmotor case design allows oil to circulate freely at all times. Only attention required is to change oil twice a year.

MOTORS INTERCHANGE TO MEET CHANGING CONDITIONS

Any NEMA frame standard type Westinghouse motor is interchangeable on the standard gear case. If postwar conversion requires moving gearmotor to new location, type or enclosure of motor can be easily changed to meet new conditions.

HEAT-TREATED GEARING —FOR LONG LIFE

"Tough-hard" teeth on surface for long wear—with tapering hardness through the metal, leaving the core tough and strong. Outside surfaces are made extremely hard to resist abrasion—inside cores are made extremely tough to withstand impact stresses.

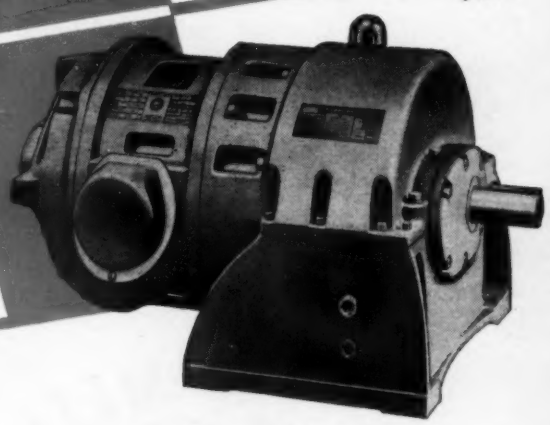
HIGH EFFICIENCY

The efficiency of the new Westinghouse Gearmotor is high—only 2% loss is involved per gear set. Single reduction units offer 98% efficiency, double reduction units 96%.

EASY TO SELECT TO FIT THE JOB

The new Westinghouse Gearmotors meet A.G.M.A. recommended application practice which makes it easy to order matched gearmotors to any job—eliminates confusion in drawing up specifications.

J-07215



COMPLETE DRIVE ASSEMBLY IN ONE UNIT

No separate handling, mounting and aligning of separate parts —just ONE unit which can be installed quickly, conveniently and economically.

For gearmotor application information, write for booklet B-3218. Address Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

You Have Looked at our New Catalog

But Have You Really Seen It?

★Yes . . . it is a good looking piece of trade literature, bound in an attractive, orange cover with a large KENNAMETAL carbide tipped tool spotlighted in the center—*but that is not the point.*

There is valuable information *inside* this new KENNAMETAL Catalog and it will pay you to make full use of it—information that will increase the efficiency of your machining operations and help you maintain maximum production.

The greatest cutting performance in any given operation can be reached only if the correct grade and style of carbide tool are employed. Catalog 43-C covers in detail the characteristics and recommended applications of the entire line of standard and typical KENNAMETAL tools—for example:

★ How to select the proper grade
★ How to specify and order tools and blanks
★ When to use chip breakers
★ Proper grinding instructions
★ How to avoid grinding cracks
★ How to braze blanks to steel shanks
★ Milling steel with KENNAMETAL tipped cutters

Do you have *your* copy?—and are you taking full advantage of its helpful features?

KENNAMETAL

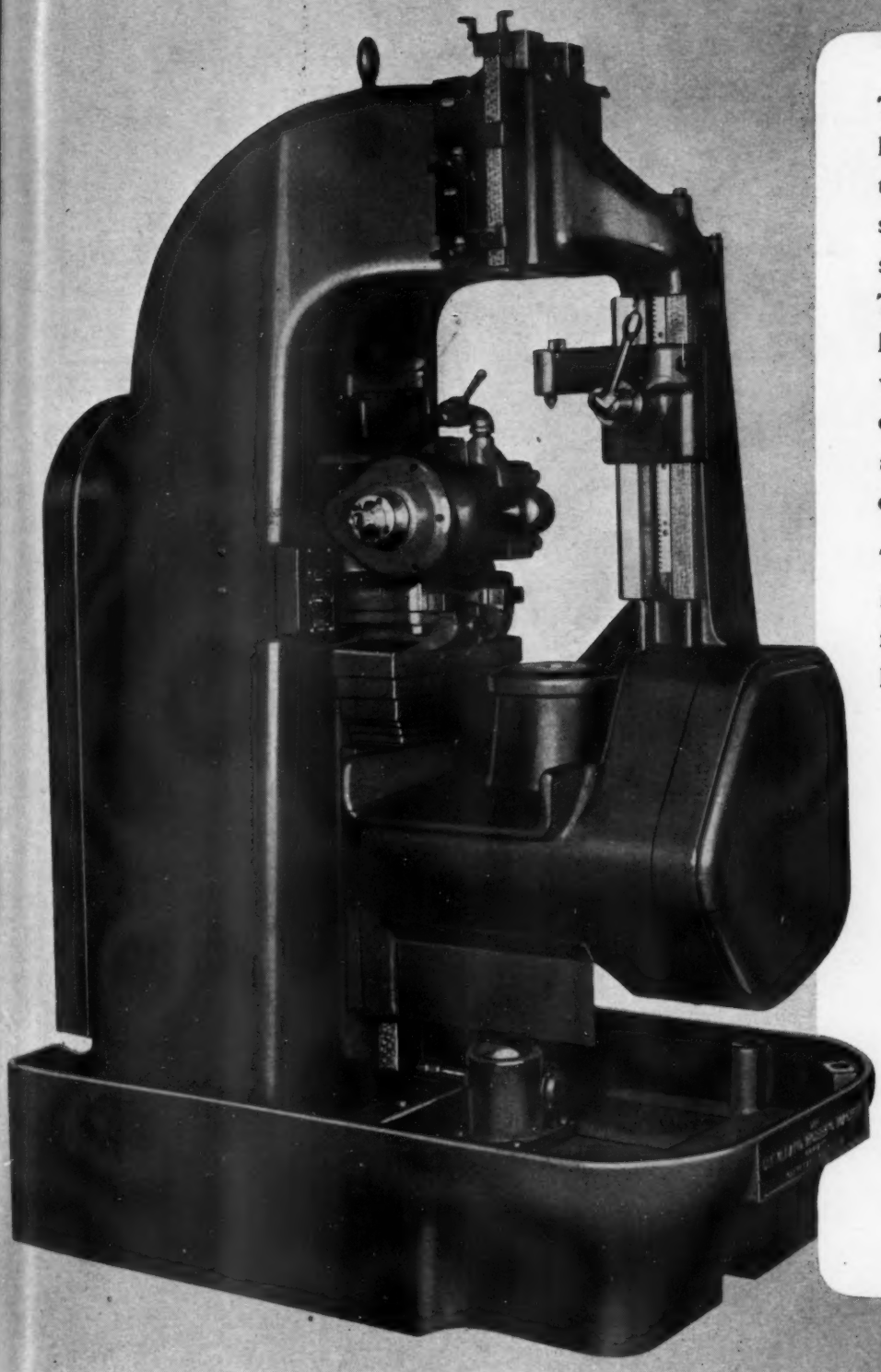
Trade Mark Reg. U. S. Pat. Off.

KENNAMETAL Inc.
103 LLOYD AVE.
LATROBE, PENNA.

SUPERIOR CEMENTED CARBIDES

Hobs **GEARS** *and* **SPLINES** *Accurately*

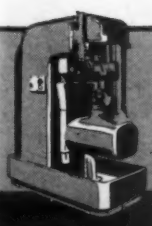
THE RIGIDHOBBER



The Rigidhobber presents a high production method for the accurate duplication of spur and helical gears—straight and helical splines. The rigid support to the work-head both above and below work eliminates spring in either work or hob and assures dependable precision of all work.

The Rigidhobber is also built in the 8 spindle rotary model for the mass production of highly accurate work.

This bulletin tells all about Rigidhobbers–what they are –how made–and how they can help you reduce costs.



The CLEVELAND HOBBING MACHINE Company

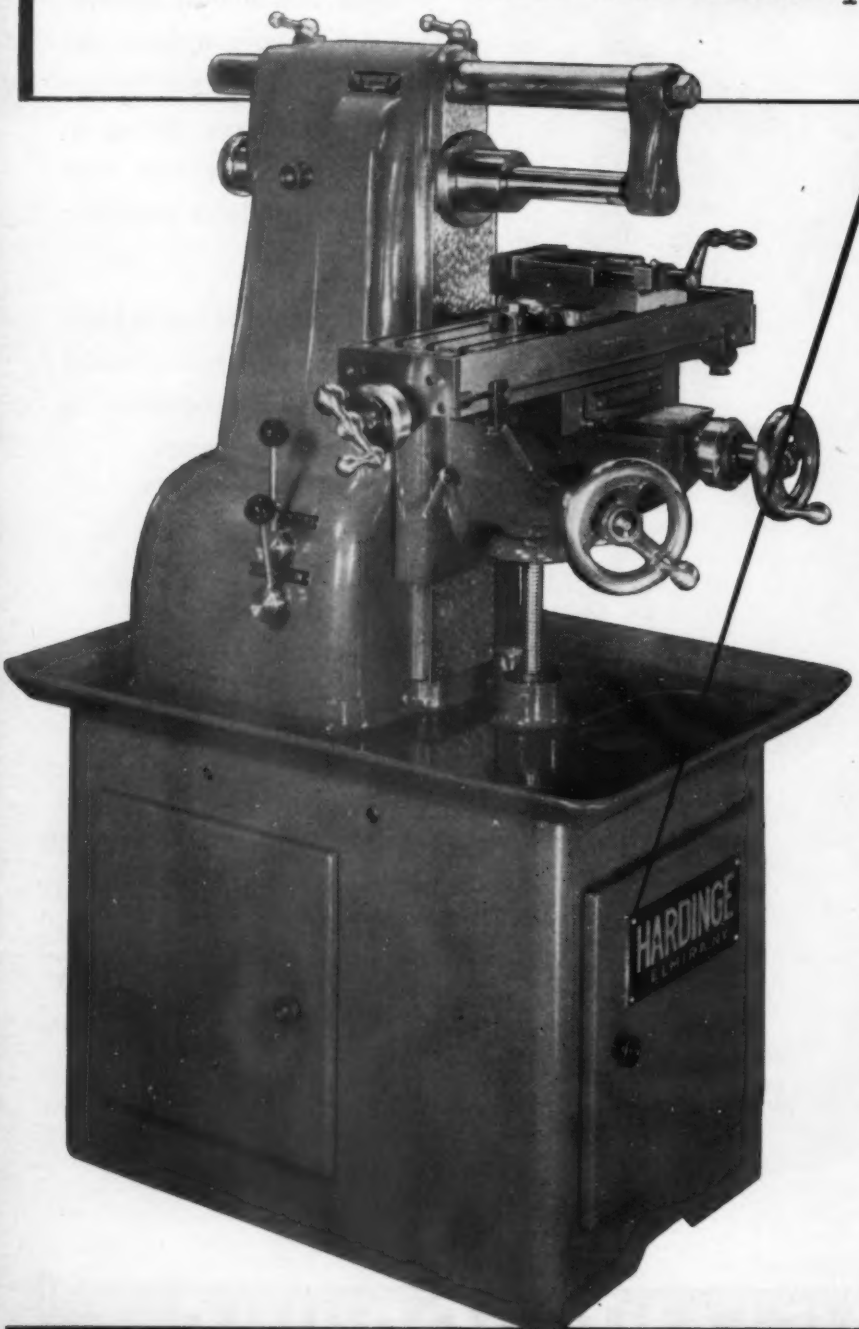
General Offices:
1311 CHARDON ROAD
CLEVELAND 17, OHIO

Chicago Office:
624 S. MICHIGAN AVE.
CHICAGO 5, ILLINOIS

BUILDERS OF RIGIDHOBBERS AND RIGIDTURNERS

HARDINGE

High Speed Precision MILLING MACHINE is designed for your tool room and laboratory



Precision tool room milling is profitable on this milling machine, designed to meet a definite need in the tool room and laboratory. The precision construction, along modern lines, combines ruggedness with extreme accuracy for ease of operation. Investment and time cost will indicate that larger milling machines are extremely expensive and awkward for many tool room and laboratory milling operations.

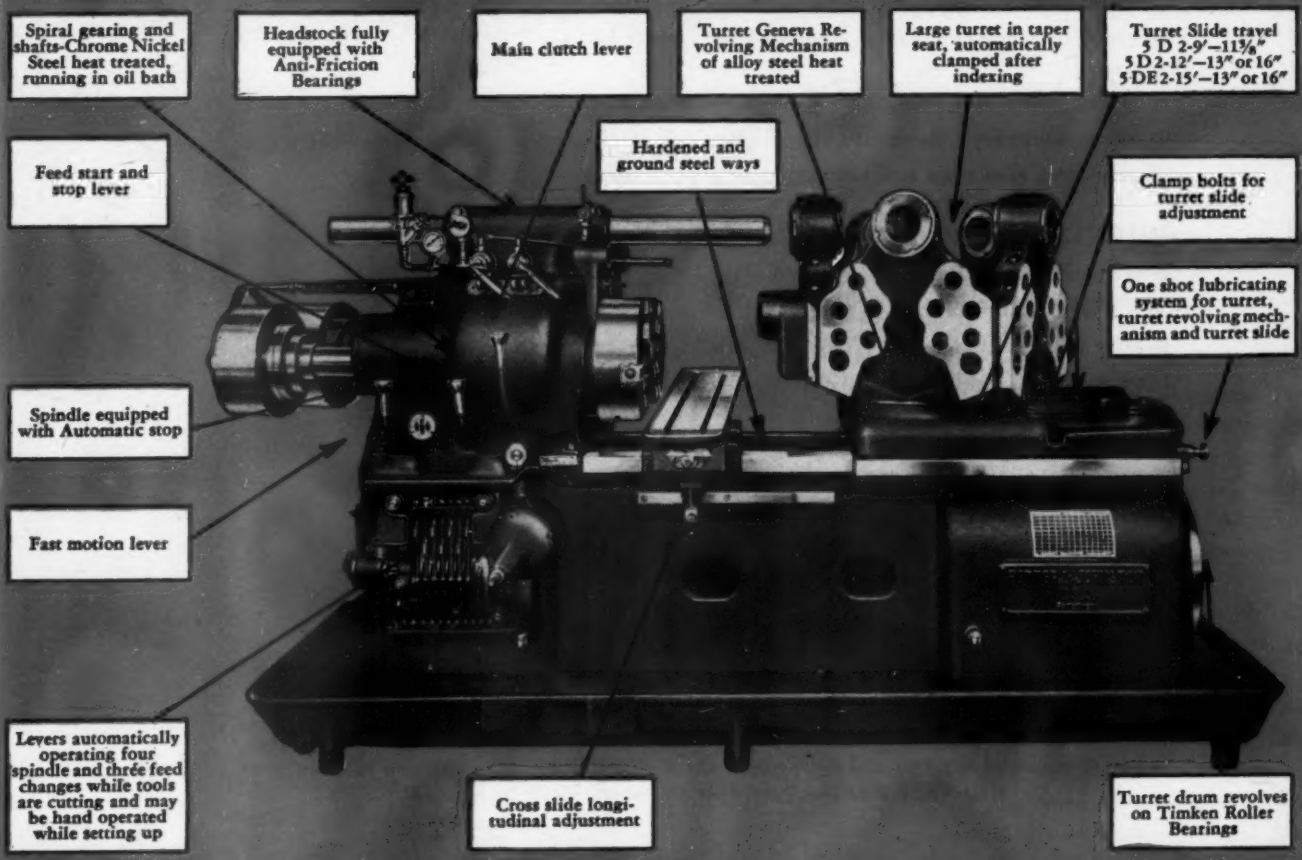
SPECIFICATIONS

1" collet capacity, 14" longitudinal, 13¼" vertical, 5½" transverse travel, eight speeds from 110 to 1850 R.P.M. TM model for plain milling, UM model for spiral milling.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

P&J 5D

2-9
2-12
E-2-15


Spiral gearing and shafts-Chrome Nickel Steel heat treated, running in oil bath
Headstock fully equipped with Anti-Friction Bearings
Main clutch lever
Turret Geneva Revolving Mechanism of alloy steel heat treated
Large turret in taper seat, automatically clamped after indexing
Turret Slide travel 5 D 2-9″—11⅜″ 5 D 2-12″—13″ or 16″ 5 DE 2-15″—13″ or 16″
Feed start and stop lever
Hardened and ground steel ways
Clamp bolts for turret slide adjustment
One shot lubricating system for turret, turret revolving mechanism and turret slide
Spindle equipped with Automatic stop
Fast motion lever
Levers automatically operating four spindle and three feed changes while tools are cutting and may be hand operated while setting up
Cross slide longitudinal adjustment
Turret drum revolves on Timken Roller Bearings

The 2-SPINDLE POWER-FLEX Automatic Chucking Machine

Outstanding Output . . . at Low Production Cost . . .

Note the features of this powerful, convenient highly accurate, highly productive machine. Many records of performance disclose output of duplicate parts within its range greatly in excess of that from a single spindle unit.

The 2-spindle POWER-FLEX, designed to meet specific shop conditions, makes it possible to perform an operation on two subjects simultaneously, or when cuts involved are sufficiently in balance, it is possible to handle one operation on one subject and supplementary work at the same time on another subject. For a given output, the two-spindle POWER-FLEX offers lower first cost, power savings and conservation of floor space when compared with two single spindle machines.

Bulletin 111 gives complete details. Ask for your copy.

INVEST IN AN EARLY VICTORY BY BUYING MORE WAR BONDS NOW!

The POTTER & JOHNSTON MACHINE CO., PAWTUCKET, R.I.

BIG

little things with

JOBS

Ultra smoothness and extreme accuracy in the mechanical world mean more efficient operation, more dependability, longer life.

It is the *forte* of honing and superfinish stones to create ultra smoothness and extreme accuracy; to create those physical attributes far beyond the capacity of anything else man has yet contrived.

MID-WEST MICRO BOND honing and superfinish stones have blazed many new trails in the field of superb finishes and extremely close tolerances. Many of Uncle Sam's weapons of war—tanks, guns and planes—owe a portion of their deadly efficiency to a MID-WEST honing or superfinish stone often smaller than a match. Truly such tiny items are little things with big jobs!

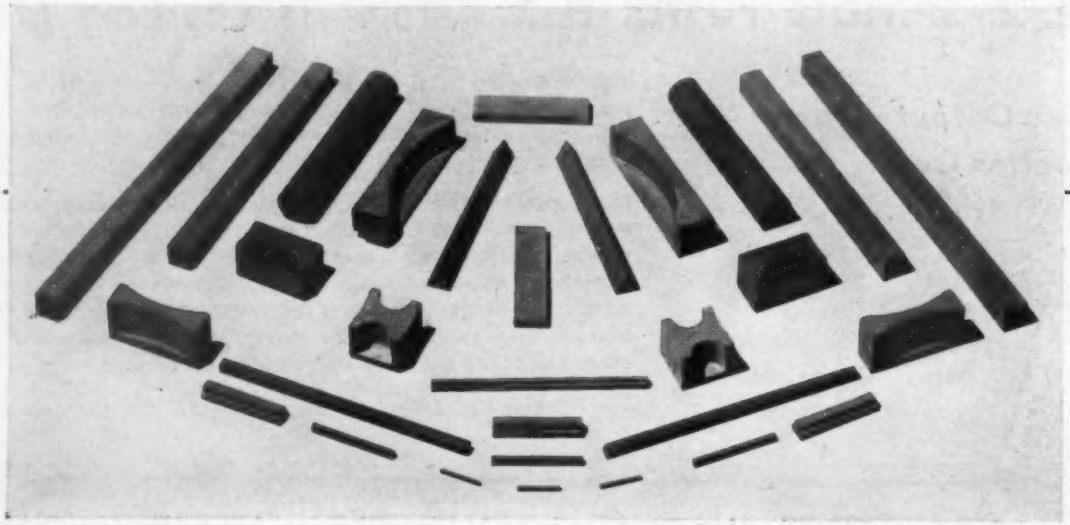
MID-WEST honing and superfinish stones—*the world's most efficient abrasives*—come in any size, any shape, any grain, any grade. They last longer, cut faster and produce smoother surfaces with less heat.

MID-WEST ABRASIVE COMPANY

Manufacturers of DEPENDABLE Abrasives

1960 E. Milwaukee Avenue Detroit 11, Michigan

MID-WEST'S complete line of abrasive products also includes grinding wheels for any purpose, coated abrasives of any type and compounds. Let a MID-WEST service engineer tell you what MID-WEST abrasives have done for others. You'll be amazed!



How can machine tools avenge this

Dunkerque in Arkansas?

This is no enemy propaganda. No "usually well-informed sources" or Berlin broadcasts tell this tale. This is real . . . this is here . . . and this is defeat.

Our own private *peacetime* Dunkerque — in Arkansas, in New York, in West Virginia or California — in countless American "homes" where millions of people are ill-housed, ill-clothed, and bodily and mentally ill-fed.

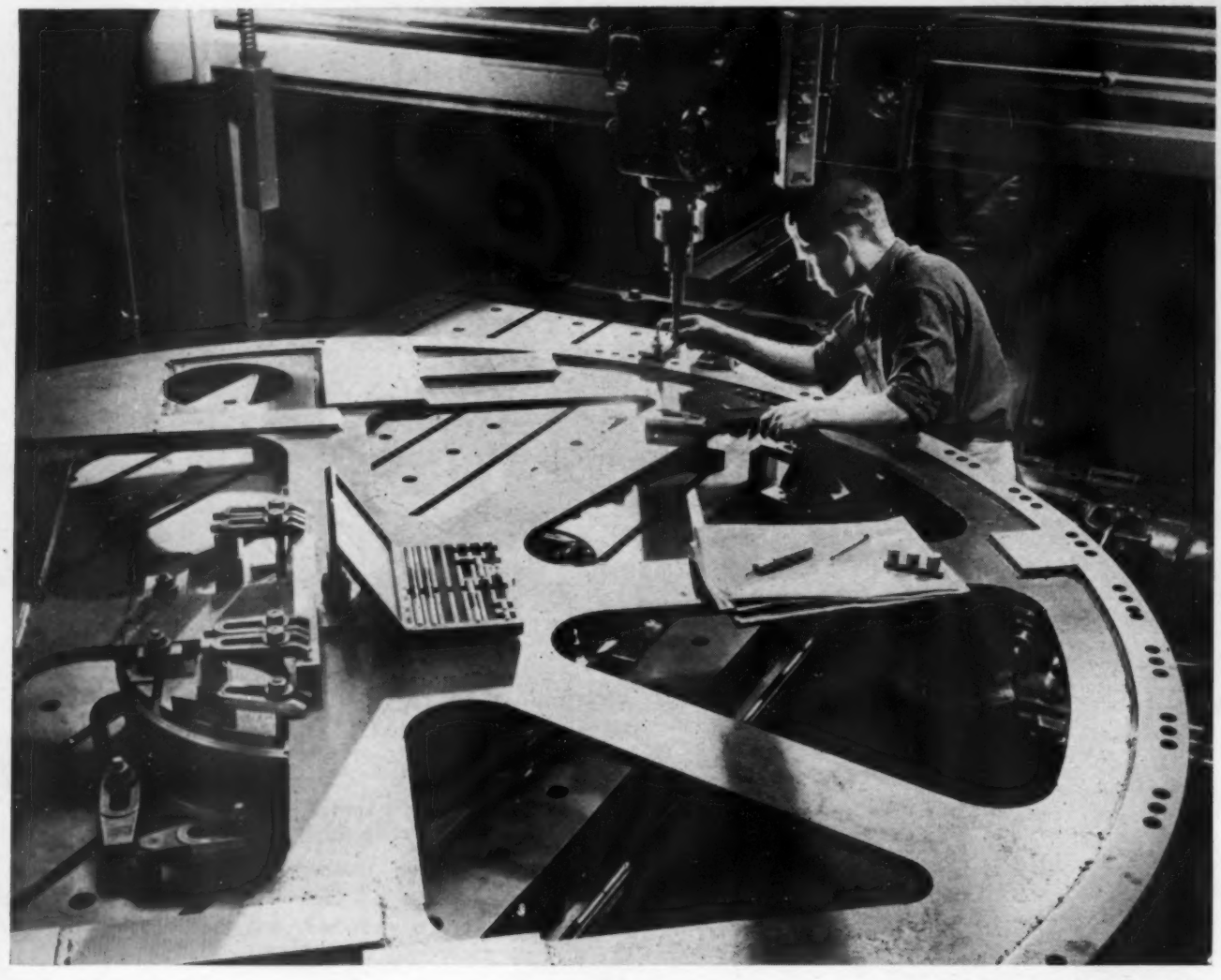
What part will machine tools play in turning this kind of defeat into victory? The *whole* part, if the men of industry have the vision and the freedom to plan ahead, and to carry out what they plan.

If you are a manufacturer, there is one thing you can do at once: Have your production men and planners consult now with the engineers of the leading basic machine tool producers. They can help you in planning today your part in the peace that must be won after the war is won.

One of these is a Bryant man. . . . We invite you to send for him.

BRYANT

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U. S. A.



Courtesy of Boeing Aircraft Co.

Machining Master Gauges for Flying Fortresses on

GRAY PLANER TYPE MILLING MACHINES

● This is typical of Gray Milling Machines adaptability to precision operations and illustrates its versatility in handling unusual jobs, easily — accurately. This machine combines the speed, flexibility, and ease of control of smaller knee type machines with the power, rigidity and accuracy of planer type machines.

THE G. A. GRAY COMPANY
Cincinnati Ohio, U. S. A.

THE GRAY LINE — Double Housing and Openside Planers, Switch Planers, Die Block Planers, Double-Housing and Openside Milling Planers, Planer Type Milling Machines, Horizontal Borir. Machines.

UNION

For Wartime Tool Economy

Present conditions make it vitally important that maximum service be obtained from every small tool. One of the first steps toward tool economy is to choose tools that are known for their ruggedness and longer lasting accuracy.

Choose UNION Tools — treat them well — and you will see the results of your economy in the longer accurate service and uninterrupted production you get from every tool bearing the UNION name.

UNION TWIST DRILL CO.
ATHOL, MASS.

S. W. Card Mfg. Co. Div., Mansfield, Mass.
Butterfield Div., Derby Line, Vt.
Butterfield Div., Rock Island, Quebec.

STORES

New York: 61 Reade St.
Chicago: 11 So. Clinton St.
Detroit: 6540 Antoine St.
San Francisco: 121 Second St.
Los Angeles: 524 E. Fourth St.
Seattle: 568 First Ave., South.

Divisions of the UNION TWIST DRILL CO.

UNION BUTTERFIELD CARD

THE **Right** REAMER FOR EVERY WARTIME JOB

Butterfield

Today's problem is to combine maximum efficiency and unquestioned accuracy in the production of parts for ships, guns, tanks, shells and planes. In plants where war production records are being set, Butterfield Reamers are turning out work that meets rigid standards of precision and, at the same time, demonstrating their ability to give long, economical service. The completeness and the uniformity of the Butterfield line make it possible to choose the "one best" tool for every job from this single convenient source of supply.

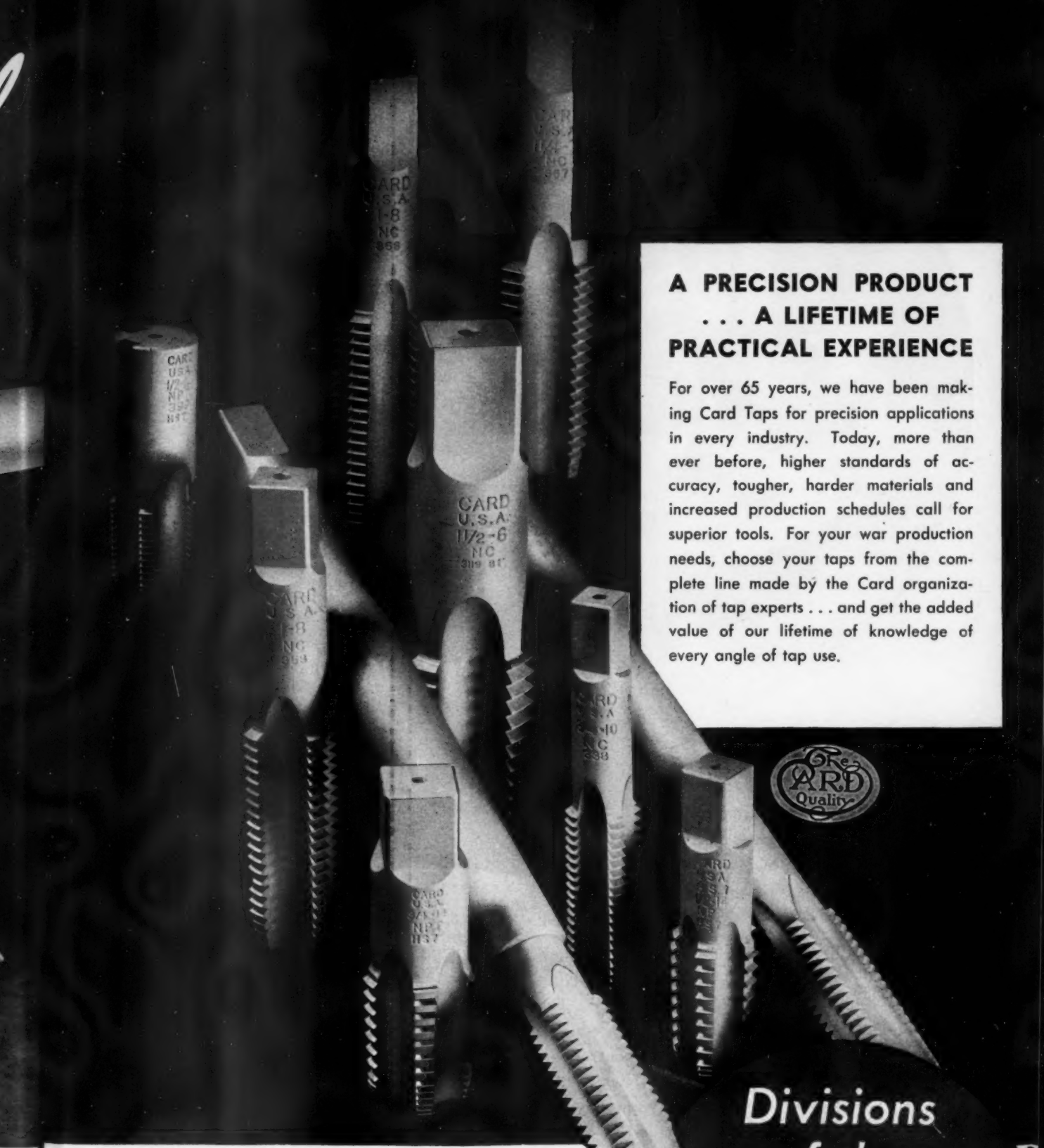
Divisions of the UNION TWIST DRILL CO.

BUTTERFIELD DIVISION

DERBY LINE, VT. **ROCK ISLAND, QUE.**

STORES: New York, 61 Reade St. Chicago, 11 So. Clinton St. Cleveland, Hal. W. Reynolds, 3346 Superior Ave. Detroit, 6540 Antoine St. Los Angeles, 524 E. Fourth St. Toronto, 137 Wellington St., West. Montreal, 111 St. Paul St., West. Winnipeg, 403 Travellers Bldg. Vancouver, 327 Shelly Bldg. Agents for Great Britain—Charles Churchill & Co., Ltd., 27-34 Walnut Tree Walk, Kennington, London, S. E. 11, England. Branches at Birmingham, Manchester, Glasgow, Newcastle-on-Tyne and Bristol.

UNION BUTTERFIELD CARD



A PRECISION PRODUCT . . . A LIFETIME OF PRACTICAL EXPERIENCE

For over 65 years, we have been making Card Taps for precision applications in every industry. Today, more than ever before, higher standards of accuracy, tougher, harder materials and increased production schedules call for superior tools. For your war production needs, choose your taps from the complete line made by the Card organization of tap experts . . . and get the added value of our lifetime of knowledge of every angle of tap use.

S. W. CARD MFG. CO.

MANSFIELD, MASS.

STORES

New York: 61 Reade St.
Chicago: 11 So. Clinton St.
Detroit: 6540 Antoine St.
San Francisco: 121 Second St.
Los Angeles: 524 E. Fourth St.
Seattle: 568 First Ave., South

Divisions of the

UNION TWIST DRILL CO.

UNION BUTTERFIELD CARD

This compact, electronic control panel (CR7503A138) can be installed on, or mounted under, the assembly bench. A calibrated dial on the front provides easy adjustment of the weld time. Time range: ½ cycle and from 1 to 10 cycles; maximum current demand: 53 amperes, at 230 or 460 volts.

New Precision Control for Small, Difficult Spot Welds

HERE'S a new electronic control unit for low-capacity resistance welders. It is especially suitable for welding small copper, brass, bronze, and steel parts which are usually soldered, brazed, or riveted.

Designed for high-speed production, this new control unit may effect as much as a 2-to-1 saving in time compared with conventional methods. The welds are uniformly good; spoilage is reduced. These results are possible because the control can be operated at speeds as high as 350 times a minute, yet welding current will be the same for each weld, and the operator has at his fingertips precise control of the time of current flow.

A number of these electronic control units are being used in our own factory to provide the precise control required in the manufacture of G-E electronic tubes. Since their installation, not only has production increased, but the records also show fewer rejects, more consistent welds, and lower maintenance cost.

ELECTRONIC CONTROL

General Electric has a complete line of electric equipment for resistance-welding machines, including electronic control for spot and seam-welders, weld and sequence timers, weld recorders, cable, instruments, circuit breakers, transformers, capacitors, motors, and control. Whatever your welding job, consult your welding-machine manufacturer for the right type of equipment. Or contact our nearest office; our engineers will be glad to help you. *General Electric Co., Schenectady, New York.*

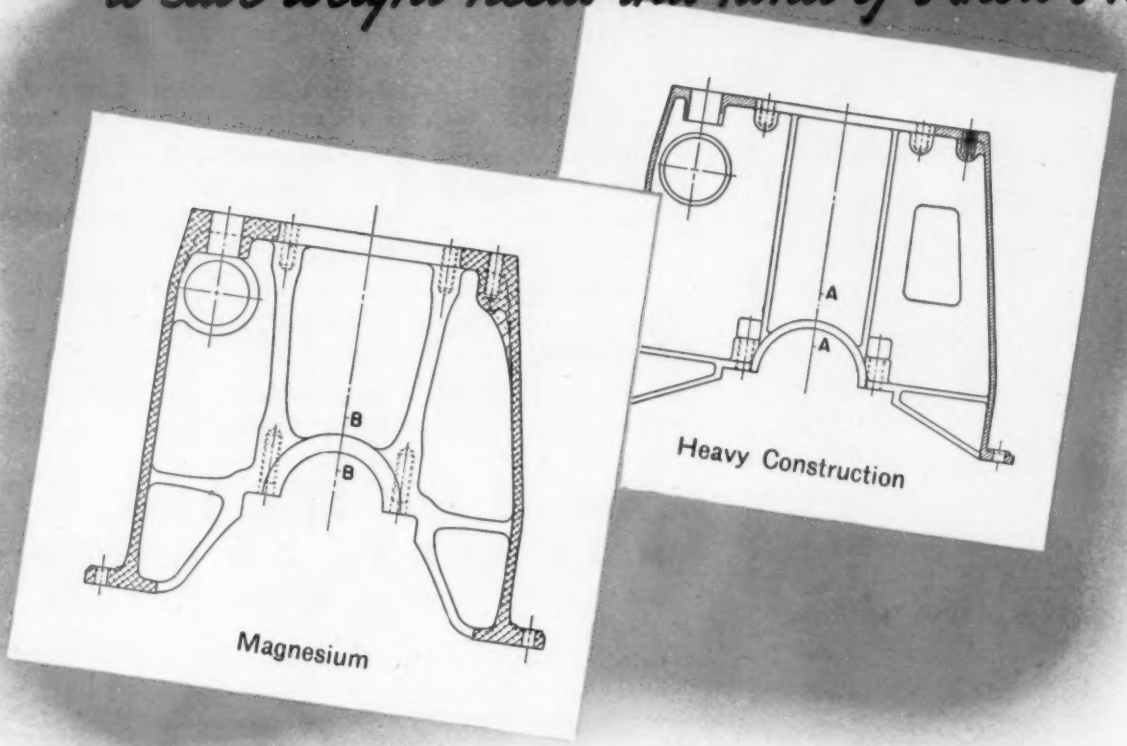
Every week 192,000 G-E employees purchase more than a million dollars' worth of War Bonds.

GENERAL ELECTRIC

645-25-2960

Redesigning

to save weight needs this kind of "Know How"



Reduce the weight of an engine or machine part according to rules contained in the new book, "Designing with Magnesium", and it will quite likely look like this:

Sections will be somewhat thicker and deeper to compensate for magnesium's lower modulus of elasticity. Holes that were included to save weight in heavy metal construction will be eliminated. Fillets will have larger radii and all sections carrying main stresses will be carefully blended where they join. Thread lengths for studs will be increased and loads from these fastenings will be well distributed over large areas.

This is good design for construction in any metal. But in magnesium, it assures maximum dependability while accomplishing the desired weight saving.

How to design for production in magnesium, how to produce those parts with maximum economy, how to assure their dependable performance—these are things which American Magnesium have learned in their more than twenty years of working with magnesium alloys. These are the things which make American Magnesium your best contact for engineering help and your logical source of supply.

American Magnesium Corporation, 1709 Gulf Building, Pittsburgh, Pennsylvania.

MAGNESIUM MAZLO PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

"PUT IT ON THE BLANCHARD"

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- Production
- ★ Adaptability
- Fixture Saving
- Operation Saving
- Material Saving
- Fine Finish
- ★ Flatness
- ★ Close Limits

★ . . . . . *Especially valuable on jobs like the one illustrated.*

HERE are two surface grinding problems that came to the Blanchard Engineering Department in one week:

(1) Grind a hardened steel ring 86½" in diameter to a tolerance of ±.0002" for thickness.

(2) Grind the edges of a steel strip, .005" thick, .125" wide, and 20" long, straight and to a tolerance of ±.0005".

Thirty years experience in grinding flat surfaces enabled Blanchard Engineers to solve the grinding of both of these jobs, using Blanchard vertical Surface Grinders and Blanchard Grinding Wheels.

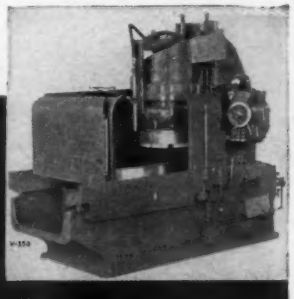
If you have work which lies within the range here indicated, you should investigate the possibilities of a Blanchard.

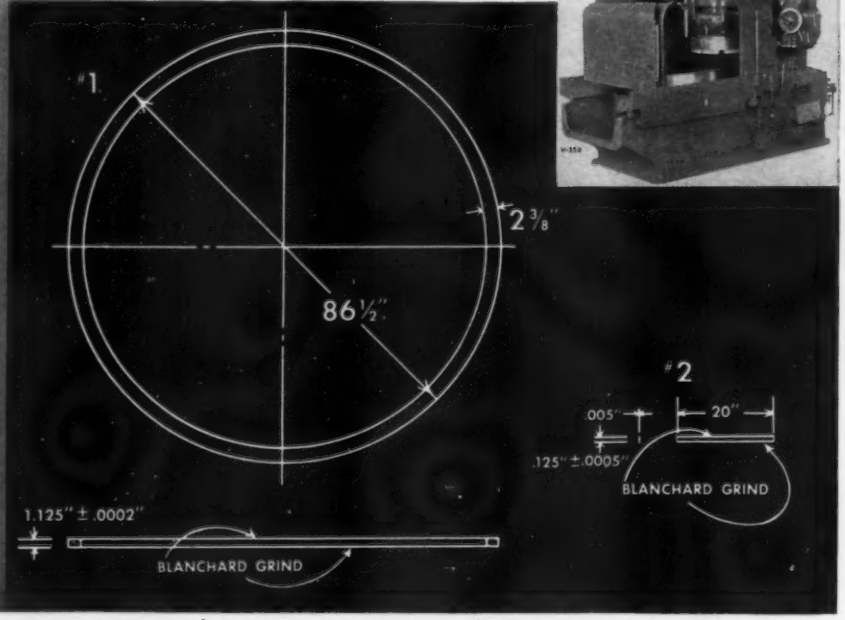
Whether the job is large or small, usual or unusual, Blanchard can show you how to grind it better and faster.

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE, MASS.

Grinding Hardened Steel Rings and Edges of Steel Strip on Blanchard Surface Grinders.

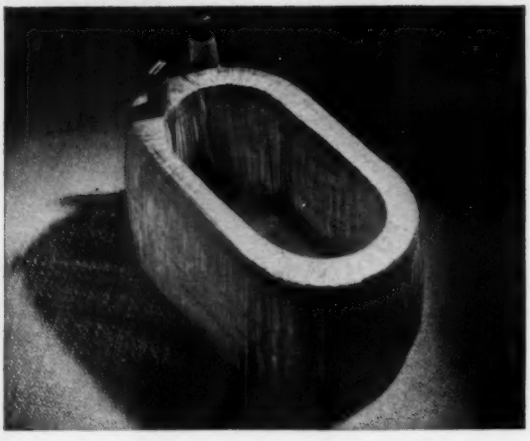




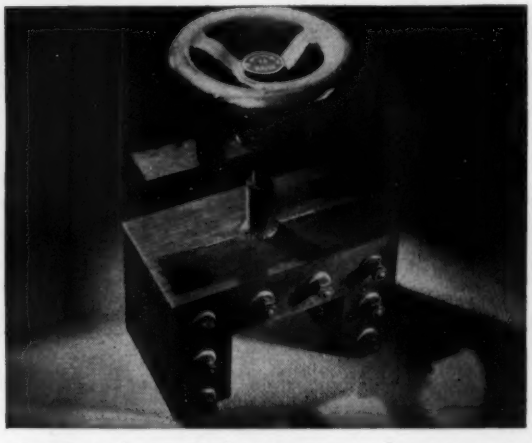
BLANCHARD

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

AMPAC "400" GIVES YOU IDEAL SIZE AND RANGE!

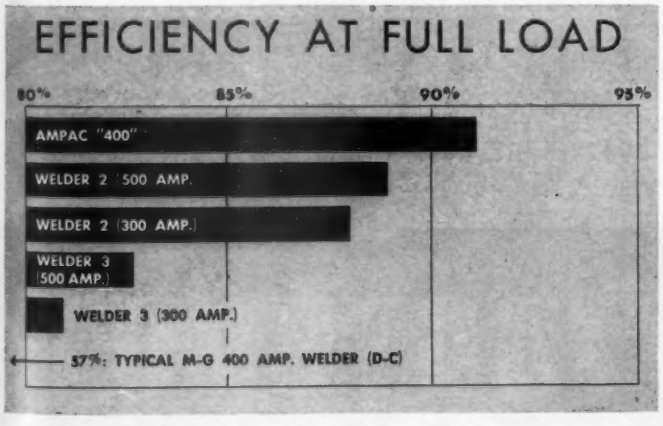


1 Top welder *engineering*, too, is incorporated into every Ampac. This compact reactor coil is efficient . . . cool-operating. Its spun-glass insulation is *flame-proof!*



2 Ampac gives you *all* a.c. welding advantages — including *no arc blow!* Wide 50-500 amp range provides capacity for *90%* of all welding needs! Simply designed and ruggedly constructed for gruelling wartime service. *Minimum* maintenance required!

3 Smooth one-inch movement of upper core covers entire welding range . . . in *seven turns* of control wheel. Result: less time for *adjustment* — more time for *production!*



4 High welder efficiency means *decreased* power consumption — and therefore *lower power bills!* Compare Ampac's excellent rating against two largest selling a.c. welders and a typical d.c. unit. You *save* with Ampac! A 1678

GET THE FULL STORY on this great new welder from your nearby Ampac dealer or Allis-Chalmers district office. Learn about its exclusive patented circuit. Ask for bulletin B6302 . . . also B6241 on Ampac "200".

ALLIS-CHALMERS

MILWAUKEE, WISCONSIN

AIDS to More Productive DRILLING

★ Back gear unit for slow speeds when drilling in tough steel

★ Power feed for production drilling and reaming

★ With back gear unit and power feed the Footburt Sensitive is a full range production drill with a wide range of speeds for drilling with small drills in soft metals or for counterboring and spot facing work in tough tool steels. Using a single speed motor with optional speed ranges provides speeds from 185 to 2300 R. P. M. or from 275 to 3500 R. P. M. You will find these machines adaptable for many production drilling jobs in your war work.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

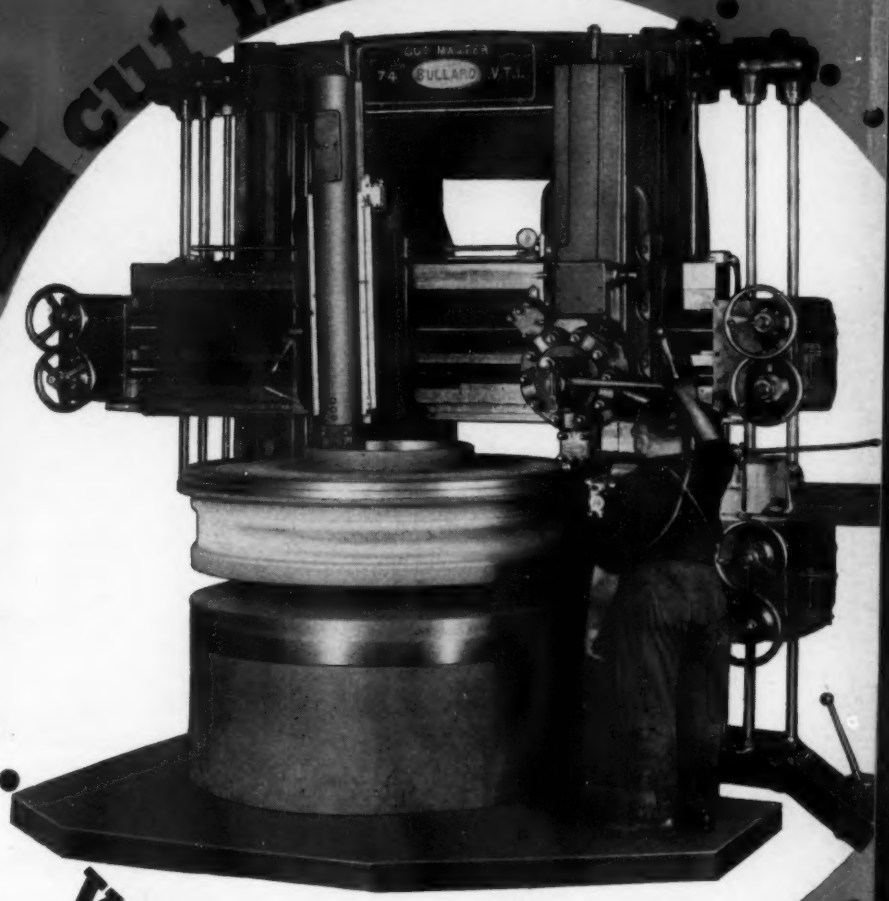
Detroit Office: General Motors Building

FOOTBURT *Sensitive* DRILLING MACHINES

MOVE UP THE SCHEDULE ☆ WIN THE WAR QUICKER

Versatility in the Largest Bullard

the 74" cut master . . . vertical turret lathe . . .



Cut Master has available three types of heads: Vertical Ram Head, Vertical Turret Head on the main rail, and Side Head on the side rail. Each head is equipped with its own individual range of feeds and power traverse. Select any of six head combinations to meet your requirements.

2 Ram Heads and Side	2 Ram Heads
Ram, Turret and Side	Ram and Turret
Turret and Side	One Ram and Side

Widely variable speed ranges upon request.

These versatile machines can also be equipped for thread cutting, drum scoring, or angle turning.

Ask Bullard Engineers about the Four Speed Ranges obtainable.

Send for Circular, giving full specifications.

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

Retracting and Repositioning Work Within .0002 OF AN INCH—By Push Button

The most frequently needed function in a precision boring machine is that of retracting the work to facilitate measuring and tool setting.

In the DeVlieg Jigmil, this function is automatic—by fingertip control. Operation of a push button unlocks the table and moves it by rapid traverse to the desired position for measuring. For repositioning, operation of a single push button will cause the table to return to its cutting position by rapid traverse, stopping and locking automatically. Uniformity of selected position for stopping and locking is dependable within .0002".

The DeVlieg Jigmil is a new type machine—has the spacing accuracy of a Jig Borer—Performance Qualities of a Milling Machine—Convenience and Flexibility of a Horizontal Boring Mill. All control is so centered and organized that the operator never has to take his eyes off the work.

Thus, the Jigmil fulfills the machine tool ideal—a powerful and accurate extension of the operator's hand.

Many machines show 75 per cent greater average daily productivity.

DE VLIEG MACHINE COMPANY
450 FAIR AVE. FERNDALE (DETROIT) MICHIGAN

Write for Circular

DEVLIEG MACHINE TOOLS

AIDING WOMANPOWER ON THE HOME FRONT

"Two million flatirons will be made. No movable parts are involved and supplies of materials are adequate to cover the program. Further, flatiron production is considered a must—because its lack forces individuals to resort to commercial laundry services, already strained beyond efficient capacity."

Put aluminum sole plates on those irons and you boost their efficiency. Heat travels fast from heating element to working surface, because aluminum has such high heat conductivity. What an easy way to speed the laundry work by the country's woman power!

Aluminum sole plates have proved themselves. They were used on thousands of electric irons before the war sidetracked from civilian production all of the metal Alcoa could make. Their lighter weight was utilized in two ways; to broaden their ironing surface, thus speeding up their work, and to achieve maximum lightness.

There now exist procedures under WPB whereby you may be able to obtain approval for the use of aluminum on your projects. Those who wish to use aluminum for the above purpose should apply to Aluminum and Magnesium Division, WPB, Washington 25, D. C.

Alcoa engineers will gladly work with you on fitting aluminum into your products. Write ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA ALUMINUM

GS TOOL CHESTS

for TOOLMAKERS—MACHINISTS—
CRAFTSMEN — *who take pride in Good Tools...and Better Work*

SCHERR TOOL CHESTS are designed and built for a life time of service and convenience. They provide a time-saving means for keeping tools in an orderly, safe manner, always ready for immediate use. Good tools which represent a big outlay in money deserve the best in tool chests. With G S TOOL CHESTS your investment in tools gets maximum protection at minimum cost. There are available for immediate delivery in a complete range of sizes and types. Prices are such as to meet the individual requirements of tool makers, machinists and pattern makers.

DEALERS WANTED — *Immediate Deliveries*

Write at once for further details on the SCHERR TOOL CHEST LINE, Sales Franchise and Resale Discount. Immediate deliveries can be made from stock. Here is a live, popular line for alert dealers. Investigate immediately!

OAK CHEST
No. 1120
11 Drawers; 2 Locks
Size:
20" x 9¼" x 16¾"
Lacquer Finish
List Price: $24.00

OAK CHEST
No. 720
7 Drawers; 2 Locks
Size:
20" x 9" x 13¼"
List Price, $18.00

OAK CHEST
No. 518
5 Drawers; 2 Locks
Size:
18½" x 9½" x 12¼"
List Price: $16.00

CLOSED-TOP POPLAR CHEST
No. 610 PC
5 Drawers; Size: 18¼" x 9½" x 10"
List Price: $12.50

OPEN TOP POPLAR CHEST
No. 720 PC
7 Drawers; Size: 20" x 9" x 13¼"
List Price: $15.00

OPEN TOP POPLAR CHEST
No. 518 PC
5 Drawers; Size: 18½" x 9½" x 12¼"
List Price: $12.50

BLACK LEATHERETTE CHESTS
No. 518 LC
5 Drawers
Size:
18½" x 9½" x 12¼"
List Price $14.00

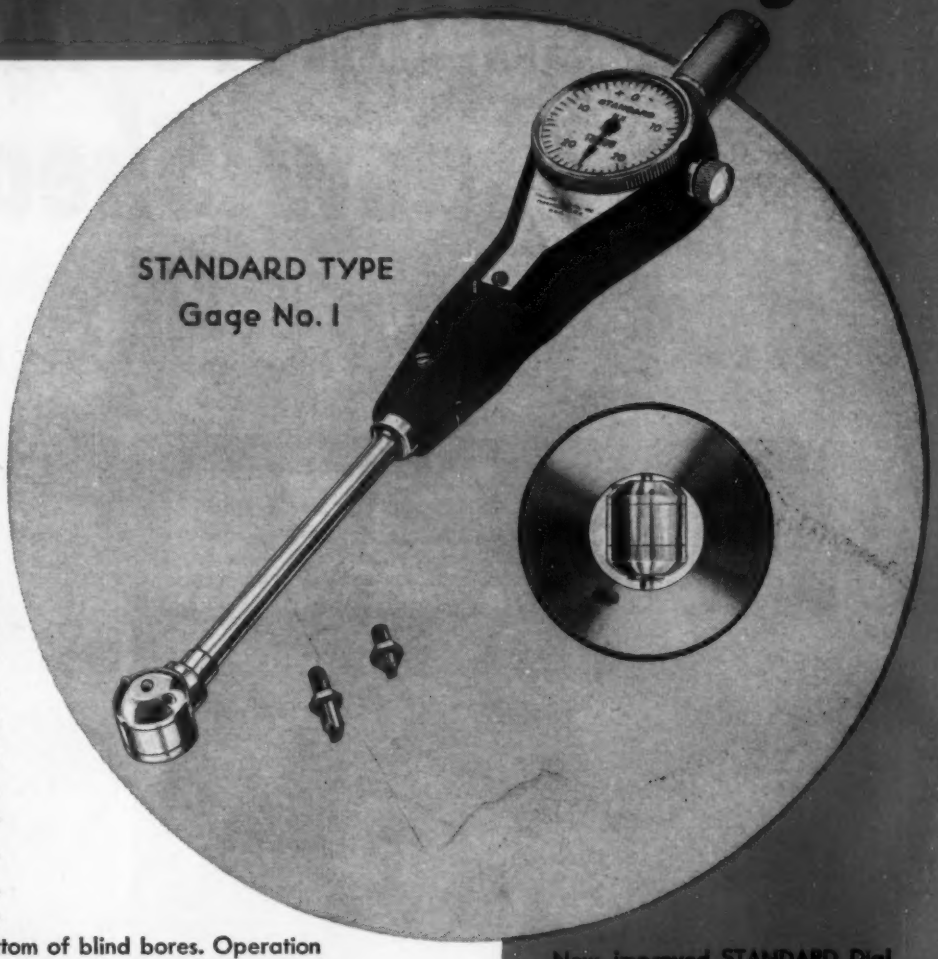
No. 720 LC
7 Drawers
Size:
20" x 9" 13¼
List Price: $16.00

GEORGE SCHERR CO.
INCORPORATED
124 LAFAYETTE STREET NEW YORK 13, N. Y.

A NEW STANDARD Dial Bore Gage

or measurements ranging from 5/8" to 1" with UX Indicator graduated in .0001"

Fast, Light, Accurate...



ERE'S the newest addition to the STANDARD family of Dial Bore Gages. A small, ightweight, fast, close-tolerance checking nstrument for small bores comparable in accuracy with the larger size dial bore gages.

Utilizing the same centralizing principle of ther STANDARD Dial Bore Gages, it is only ecessary to insert the gage, and rock handle slightly. Minimum reading on indicator hows exact diameter. Even holes with obtructions such as shoulders, webs, undercuts. tc., can be measured because this Dial Bore Gage can measure within ¼" from the bottom of blind bores. Operation s reduced to a minimum; accuracy and precision assured; and the range of workability is considerably increased as a result of improved design.

Other Dial Bore Gages with measuring range to 12⅛" completely illustrated and detailed in our new No. 10 Catalog. Send for it.

New, improved STANDARD Dial Bore Gage with diameter extensions furnished with each gage. Cross section shows gage in use.

STANDARD *Dial Snap Gage*

Combines Snap Gage Speed with Comparator Precision

STANDARD Dial Snap Gages combine PORTABILITY with speed in use and absolute accuracy on dimensions as fine as .0001". Adjustable gaging pin has a serrated flat surface tipped with tungsten carbide that practically defies wear. Opposite movable pin has mushroom top, also tungsten carbide. Point-and-plane construction assures continued, accurate readings whether instrument is set by cylindrical or flat standards.

16 Stock Sizes cover Range 0" to 8". Each can be set to measure any dimension within a range of ½". Sizes measuring up to 4" designed as at right. Sizes 4" to 8", because of larger size, are made with convenient finger hole grip for greater ease in handling.

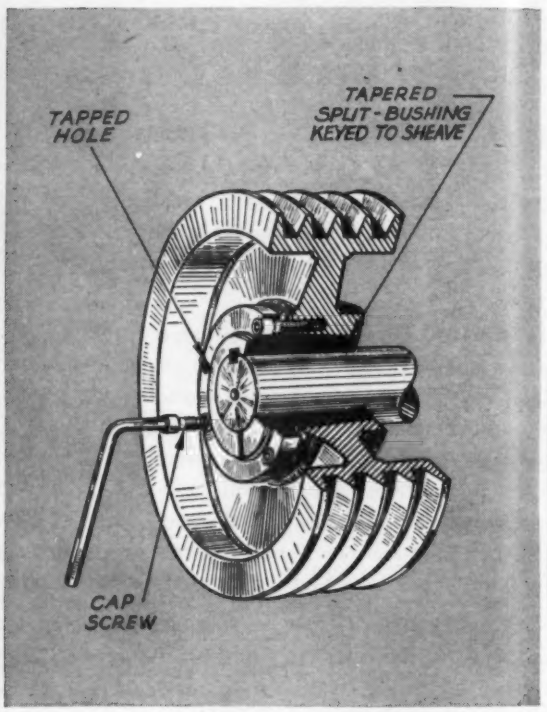
Write for Special Bulletin on STANDARD Dial Snap Gages.

ARMY (E) NAVY

STANDARD GAGE CO., Inc., *Poughkeepsie, N.Y.*

Allis-Chalmers announces a new Sheave that "Grips like Magic!"

Three cap screws, 1 small wrench, are all it takes to lock "Magic-Grip" sheave uniformly on shaft . . . creating a positive clamp fit.



We call it "Magic-Grip" because in just one quick operation sheave locks securely to shaft, saving man-hours and downtime!

DESIGNED for ease and speed in mounting and removing, Allis-Chalmers' great new "Magic-Grip" is the fastest mounting sheave on the market. Its tapered split bushing locks sheave to shaft in a single operation . . . *without forcing.*

"Magic-Grip" assures smooth running action, too. Its new design permits sheave to be mounted close to motor — reducing shaft overhang, increasing bearing life.

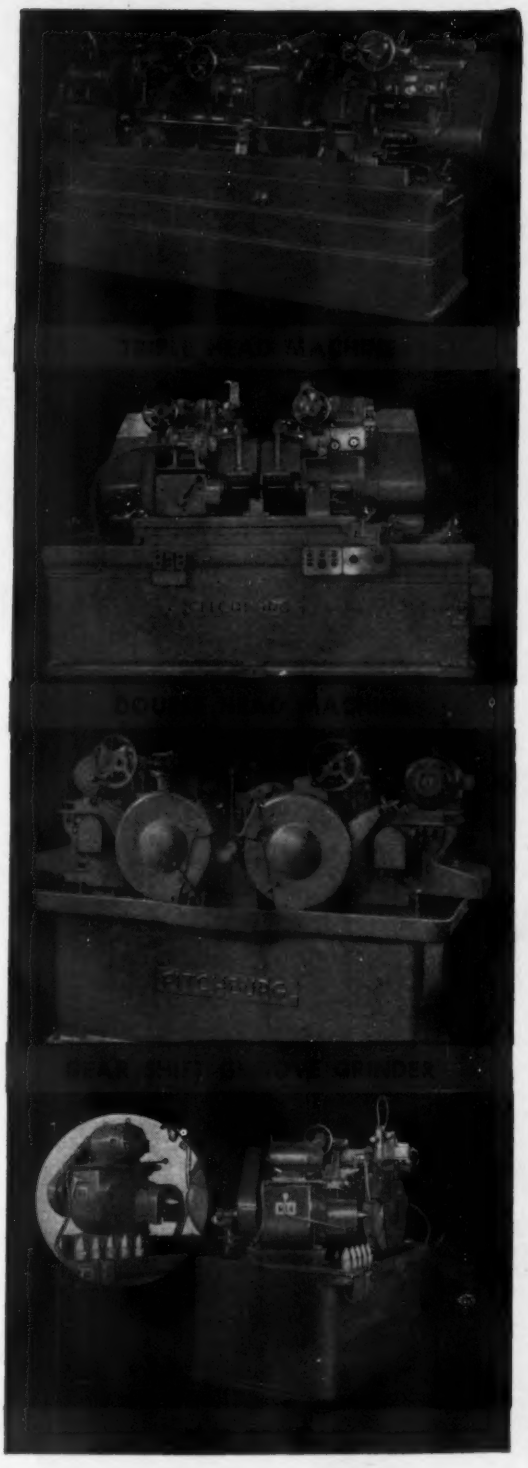
And you get these extra advantages *at no increase in price.* Now, more than ever, it pays to make Allis-Chalmers your "V-Belt Headquarters."

Sheaves that "grip like magic" are stocked in a complete line in all major cities. Ask our district office or dealer for bulletin B6310. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 1680

Allis-Chalmers Texrope "MAGIC-GRIP" SHEAVES

WHAT ABOUT *TOMORROW'S GRINDING COSTS?*

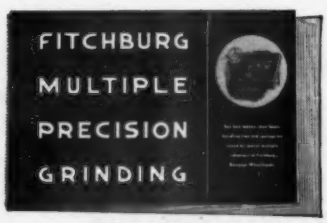


You can cut tomorrow's costs with the Fitchburg Grinders you buy today.

Fitchburg low cost method of mounting standard Bowgage Head Grinding Wheel Units for special single applications, or to multiple grind special jobs, will give you faster wartime production at lower cost, and leave you in a position to make rapid changeovers when the present emergency is over.

All Fitchburg Bowgage Head Automatic Precision Grinding Wheel Units are standard. They can be remounted on standard machines, or on new special bases, for operations other than the one originally specified. This feature protects your investment.

Save time and money — speed up cylindrical production grinding with Fitchburg Bowgage Heads.



This Book shows how to cut grinding costs. . . . Free to executives. . . . Write for it today.

FITCHBURG GRINDING MACHINE CORP.
FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of — Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.

RUBBER SHATTERS LIKE GLASS

OIL CONGEALS,
GASOLINE FREEZES

100 DEGREES BELOW ZERO!

Going down! Zero . . . 10 below . . . 50 below . . . 100 below . . . and still going! Not in a scientist's laboratory, but in everyday life . . . in industry.

Far-below-zero temperatures have been put to work. Machine parts are shrink-fitted together by the application of extreme cold to one of the parts. Methods of marketing food are being changed by new high-speed freezing processes.

Refrigerated test chambers are teaching men and airplanes how to fly in those strange and frigid atmospheres . . . the troposphere and the true stratosphere.

Today sub-zero temperatures . . . produced by General Electric Industrial Refrigeration and Air Conditioning equipment, are working in hundreds of ways to help speed up America's war effort . . . to help machines work more efficiently.

Tomorrow, when war clouds lift, these new techniques will bring benefits to all in flexible, efficient air conditioning and commercial refrigeration equipment . . . from General Electric.

General Electric Co., Air Conditioning and Commercial Refrigeration Divisions, Section 442, Bloomfield, New Jersey.

☆ BUY WAR BONDS ☆

METALS SHRINK
WATCHES STOP

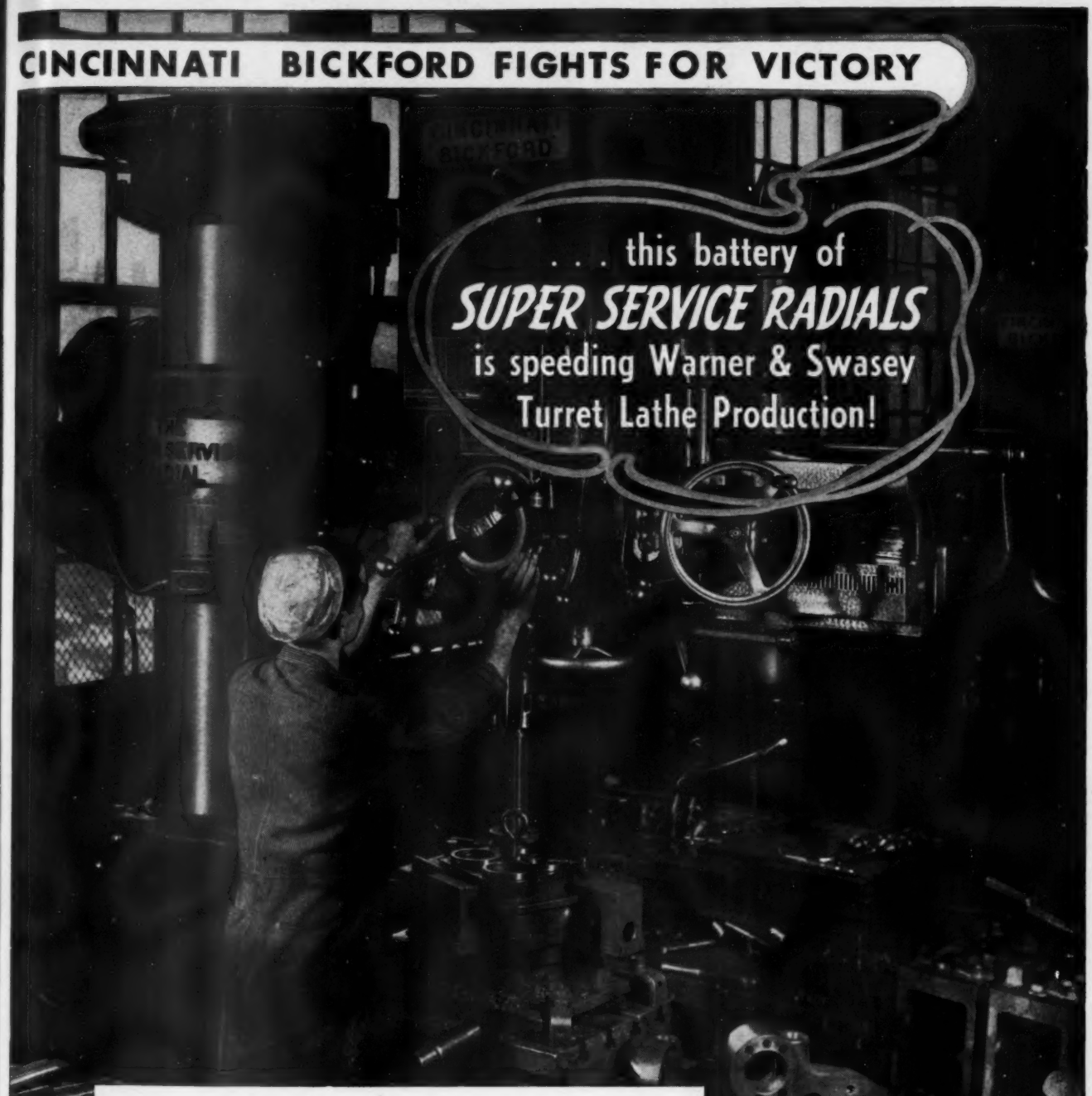
Industrial Refrigeration by

GENERAL ELECTRIC

FOOD FREEZES
INSTANTLY

Hear the General Electric Radio Programs: The "G-E ALL-GIRL ORCHESTRA," Sundays 10 P. M., EWT, NBC..."THE WORLD TODAY" News. Every Weekday, 6:45 P. M., EWT, CBS

CINCINNATI BICKFORD FIGHTS FOR VICTORY



. . . this battery of
SUPER SERVICE RADIALS
is speeding Warner & Swasey
Turret Lathe Production!

• It takes machine tools to make machine tools . . . and here in the plant of Warner & Swasey, it's a battery of Cincinnati Bickford Super Service Radials helping to turn out W & S Turret Lathes in an ever increasing stream. To bring defense production to a peak, Warner & Swasey is working 24 hours a day, 7 days a week . . . and these Super Service Radials **are on the job all the time, and doing a job all the time!**

On this particular unit, the job consists of drilling, reaming and finish boring of a W & S multiple turning head casting . . . the hole is 2½" in diameter . . . four holes are completed, plus a chamfer operation, before the piece leaves this machine.

Write for detailed information about our complete line of Super Service Upright or Radial metal drilling machines.

SUPER CB SERVICE

THE CINCINNATI BICKFORD TOOL CO.

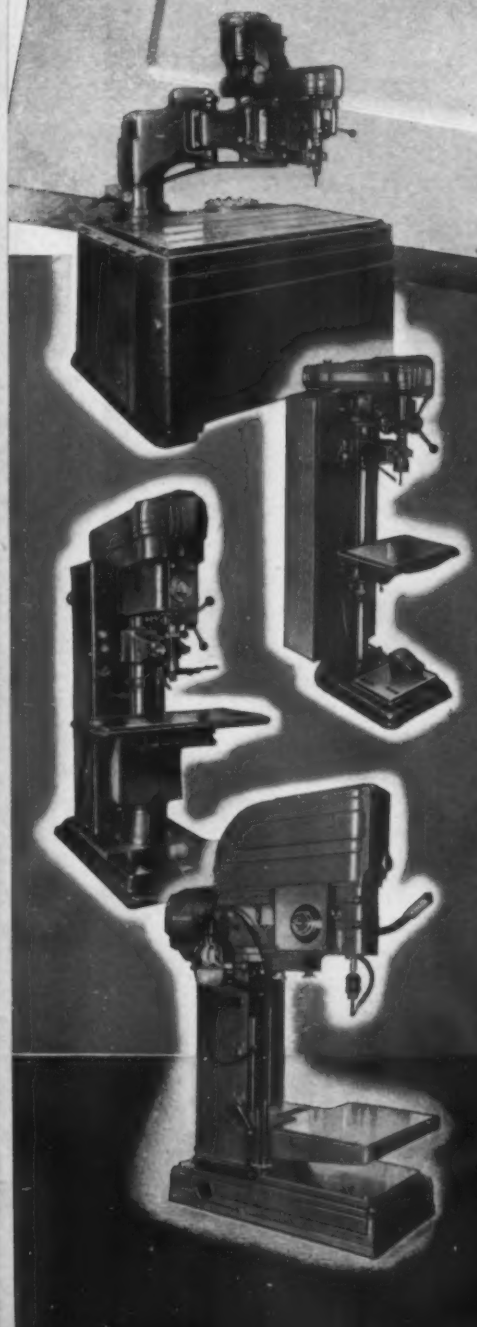
OAKLEY · CINCINNATI · OHIO · U. S. A.

Important Announcement

TO THE METAL WORKING INDUSTRY:

New Revolutionary Tapping and Threading Machine to be Manufactured, Sold and Serviced by

Warner & Swasey



WARNER & SWASEY has acquired sole manufacturing and sales rights to the Bakewell Tapping and Threading Machine. The Bakewell Tapping and Threading Machine is one of the outstanding wartime developments in machine tools.

Precision parts for aviation engines and plane assemblies demanded extremely accurate threads (often up to class 5 gage fit in small holes). Critical materials—valuable time—were wasted because of a high percentage of rejections. Tap breakage was excessive—production was slowed down.

The Bakewell Tapping and Threading Machine was specifically designed to solve these serious problems. It introduced a new principle—a patented combination of a lead screw and solenoid actuated follower. It eliminates lead error, backlash, and compensates for wear of the lead screw against the followers.

This improved Tapping and Threading Machine is a logical addition to the Warner & Swasey line. Threading or tapping is often the last operation on a finished part which has been accurately turned on a Warner & Swasey. Thread inaccuracies can mean the scrapping of a costly part and the loss of all the precision operations which have gone before.

Send for catalog or ask the Warner & Swasey field man to explain the many features and advantages of this revolutionary Tapping and Threading Machine.

WARNER & SWASEY TAPPING & THREADING MACHINE FORMERLY

Bakewell

"Extreme Threading Accuracy on a Mass Production Scale"

4 Models: No. 0—0-80 to 8/32; No. 1—8-32 to 5/8; No. 2—3/8 to 1-1/2; No. 1R—8-32 to 5/8.

Takes all Standard Taps. Class 3, 4 and 5 Gage Fits Threaded in One Pass.

WARNER & SWASEY Turret Lathes *Cleveland*

What's in This Issue

ARTHUR HAVENS

Weld Repairs Are Cheaper

Arthur Havens, welding supervisor, Rutland Railroad, and author of an article on page 91, writes that his company found repairs with new parts averaged more than the cost of a new switch, but that economies could be attained by utilizing welding to rebuild worn parts to their original dimensions. A definite sequence of operations in making switch repairs was worked out and is described.

Cutter Cost Cut

After Chevrolet had installed a battery of special-purpose machines for milling internal cooling fins in Pratt & Whitney aircraft engine pistons, they were found to require a high cost for cutter assemblies and the maintenance of a large inventory of tools. So a cutter was developed which could be made on a production-line basis with a cost saving of 75 percent. The story is an example of the manner in which tool engineers overcome problems by developing new techniques. Page 83.

Postwar International Trade

On page 88 starts the first of a series of articles evaluating postwar international trade possibilities in various foreign countries. This one is devoted to the Union of South Africa, which has seen a remarkable wartime industrialization, due to native ingenuity and machinery from Great Britain and the United States. After you've read this analysis of South Africa's industrial and commercial set-up you'll be better able to judge its position in your postwar planning.

New Approaches Get Results

The experience of many peacetime mass producers has resulted in shortcuts which have sped the output of war goods. Many specific instances of this may be found in The Nash Motors Division, Nash-Kelvinator Corporation, where large radial type Pratt & Whitney aircraft engines are made for the U. S. Navy. Unusual steps, which have made production gains, ranging from moving bushing assembly operations into the paint shop, to redesigning fixtures for silver soldering operations and mechanizing stud driving. Why these, and other, changes were made and the results they attained constitute the picture spread on pages 94 and 95.

Bedding-in

When Monarch Machine Tool Company used to move lathe carriages by hand, during the bedding-in and aligning operations, two men were occupied for five or six hours, and the "stand-by" help of four or five others was required. But now they do the job with power-driven equipment and the work of only two men. What's more, new men can be more quickly trained, and after a week or two, can scrape and align almost entirely on their own. The equipment used to effect this change is described on page 93.

Knurling on a Press

Using a specially designed rack-type knurling fixture on a 1 1/2-ton hydraulic press, Aluminum Industries, Incorporated by-passed an impending wait for delivery of a shell-knurling machine and hurried into production of 37-mm. armor piercing shot. The details of the construction and operation of the fixture constitute an article on page 96, by M. A. Beckman, vice-president of this concern.

Heat-Treat or Send Out?

Is it better to do heat-treating in your plant or should you send the work to an expert commercial shop? A. S. Eves, chief field engineer, Perfection Tool & Metal Treating Company, has surveyed the situation, with due consideration of the needs of various types of producers, and writes of his findings. His article on page 97 includes a check list the reader may complete with regard to his own needs, in order to decide whether it is more expedient to do his own heat-treating or to send it out.

A. S. EVES

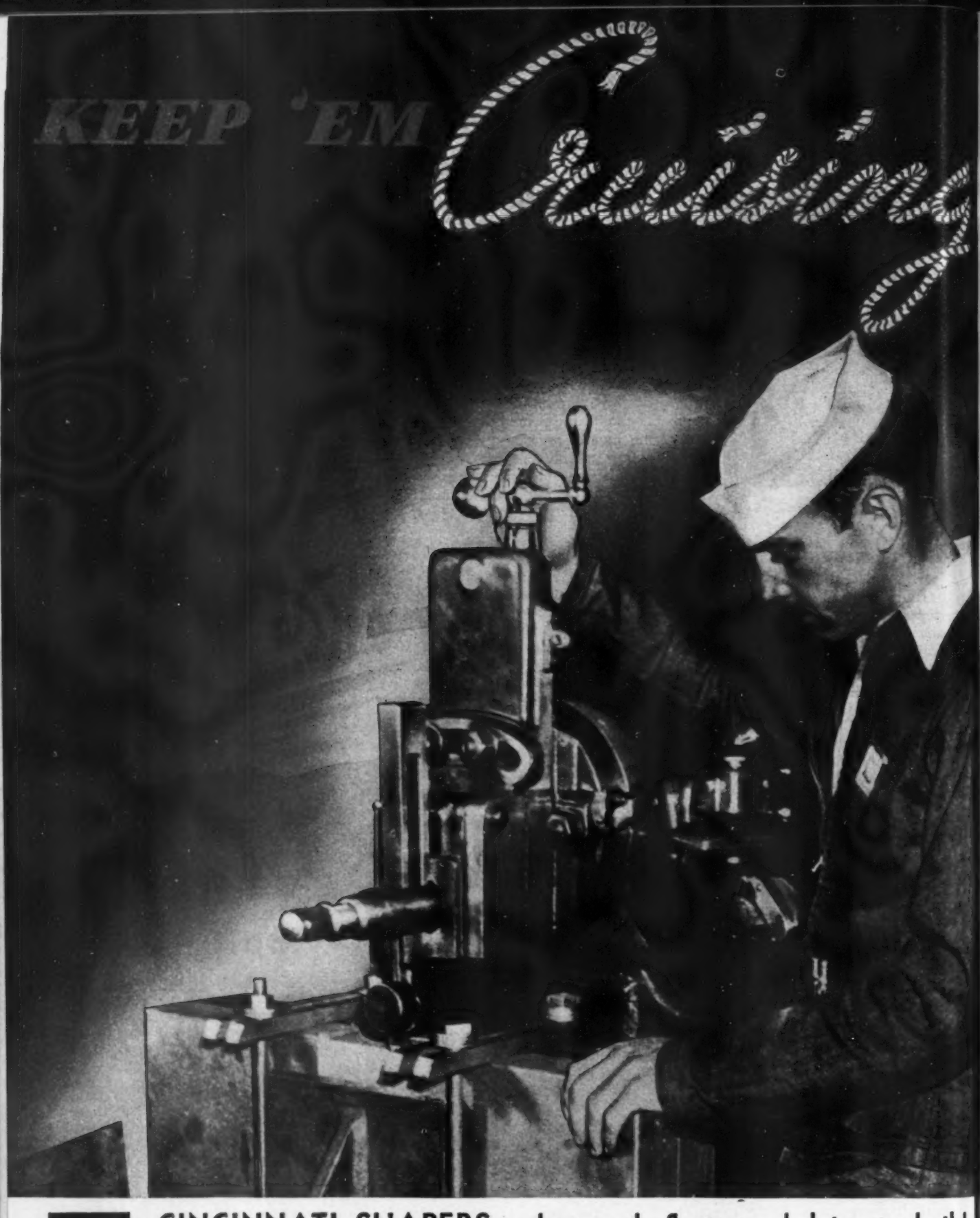
Handling Eased: Efficiency Raised

By designing a production line so that no operator need lift or carry one of the 250-lb. demolition bomb bodies it is producing, Mechanical Handling Systems, Incorporated, has sped output and cut scrap loss to a bare minimum. A detailed description of the conveyors, overhead hoists and special mechanical handling units devised to provide 100 percent mechanical handling, has been prepared by W. V. Casgrain and L. J. Bishop of that firm. Page 105.

COMING

The significances of national emergency steels in postwar metallurgy is the subject of an article Charles M. Parker, secretary, general technical committee, American Iron and Steel Institute, has prepared for an early issue. Metallurgists have learned facts which will make possible the conservation of basic mineral resources for future use, while producing alloys steels of suitable specifications.

Combining the need of returning service men for activity, exercise, training and hope, with the need of industry for trained workers, Arma Corporation made arrangements with the Navy and is training convalescent sailors and will later employ them. The details of this plan will appear in the next issue.



CINCINNATI SHAPERS, ashore and afloat, are helping to build
to maintain our battle fleets.

THE CINCINNATI SHAPER CO. • CINCINNATI, O

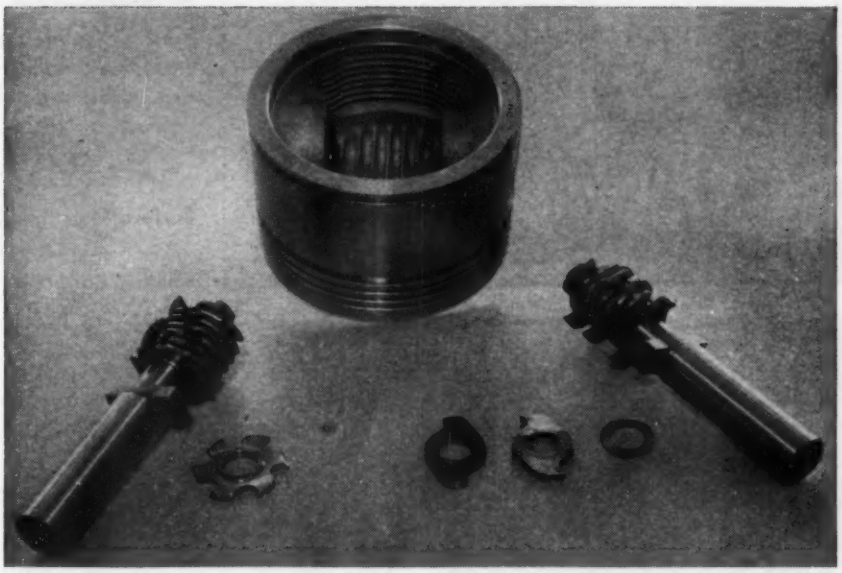
OFFICIAL U.S. NAVY PHOTO

American Machinist

ESTABLISHED 1877 • BURNHAM FINNEY, EDITOR

Chevrolet Develops Low-Cost Cutters For Finning P. & W. Pistons

Cutter blades better able to withstand conditions peculiar to milling cooling fins inside the piston are now being made upon a production line basis. Cutter cost has been reduced 75 percent



Left—The original six-tooth cutter blade dragged too much in the cut, overloaded the arbor, needed frequent resharpening, broke sometimes after two or three pieces. Right—Chevrolet developed a two-tooth cutter (with separate spacer) that reduces the load on the arbor, possesses greater stiffness to resist flexing and breakage

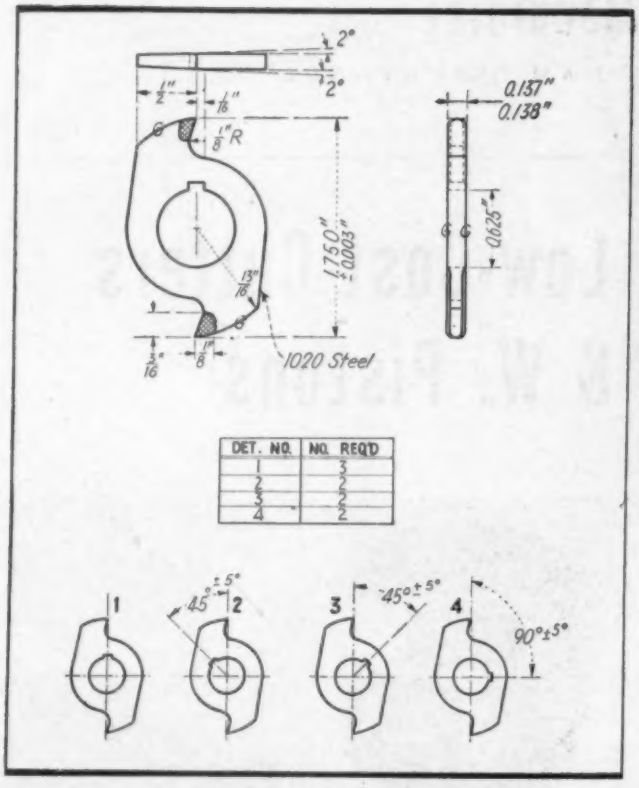
HIGH-PRODUCTION TOOLING is the exception rather than the rule in aircraft-engine plants, including those of the automotive subcontractors. It appears true, however, that the Chevrolet Motor Division of General Motors has done as much as any concern to apply its mass-production skill to engine manufacture, for in a recent month the company established an all-time record for the production of Pratt & Whitney 1200-hp. engines.

Part of this record stems from the ability of Chevrolet master mechanics and tool engineers to visualize new methods when production bottlenecks appear. For example, the P. & W. piston is one engine component made in such quantities that installation of special-purpose machine tools for some operations has proved worth while in saving floor space and labor. And like installations made in pre-war days for mass-producing automotive parts, contributions to tool design have been an important byproduct.

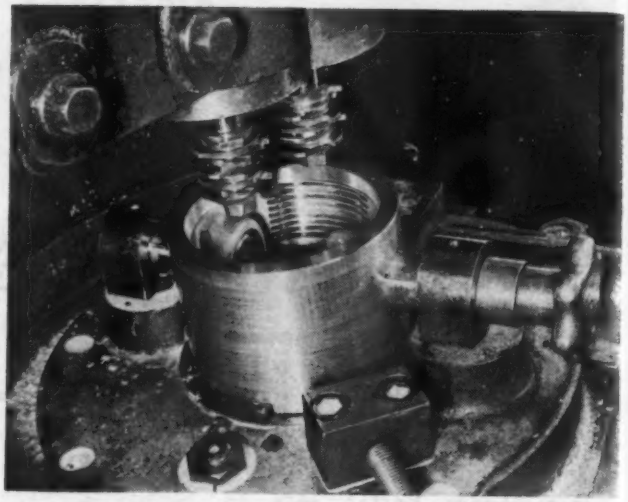
At a Chevrolet plant in Buffalo, N. Y., the most unusual special-purpose machine tool on the piston line is that employed to cut cooling fins on the interior of the piston skirt. These fins are produced by milling nine closely spaced slots at two locations; that is, between the wristpin bosses. For this operation Chevrolet installed a battery of special two-spindle vertical profilers. The special machine, which incidentally is now used in other engine plants, employs eighteen cutters, nine to each arbor. As originally purchased, high-speed steel cutter blades cost $108 per set, their life was frequently short—two to three pieces before breakage — tool sharpening was necessary at frequent intervals. As a consequence, two vendors experienced difficulty in keeping up with the demand for cutters, the inventory of blades carried at Buffalo ran into many thousands of dollars, and the tool cost per piece was excessive.

In view of these conditions, Chevrolet master mechanics and tool engineers drew upon their experience to develop more satisfactory cutters. They rejected conventionally tipped carbide cutters as being too expensive to place in the hands of operators newly recruited from non-industrial walks of life. Final result of a tool-development program was the evolution of a two-blade cutter, for which the body is blanked from SAE 1020 steel and the cutting edges are produced by depositing tungsten carbide into the tooth recesses by gas welding. Some 1500 of these cutters are now made monthly in a Chevrolet toolroom at a cost of $27 per set. Cutters are now sharpened once per shift on the average and breakage has been sharply reduced. So in addition to a cost reduction of 75 percent per cutter, the value of the tool inventory has been cut even more.

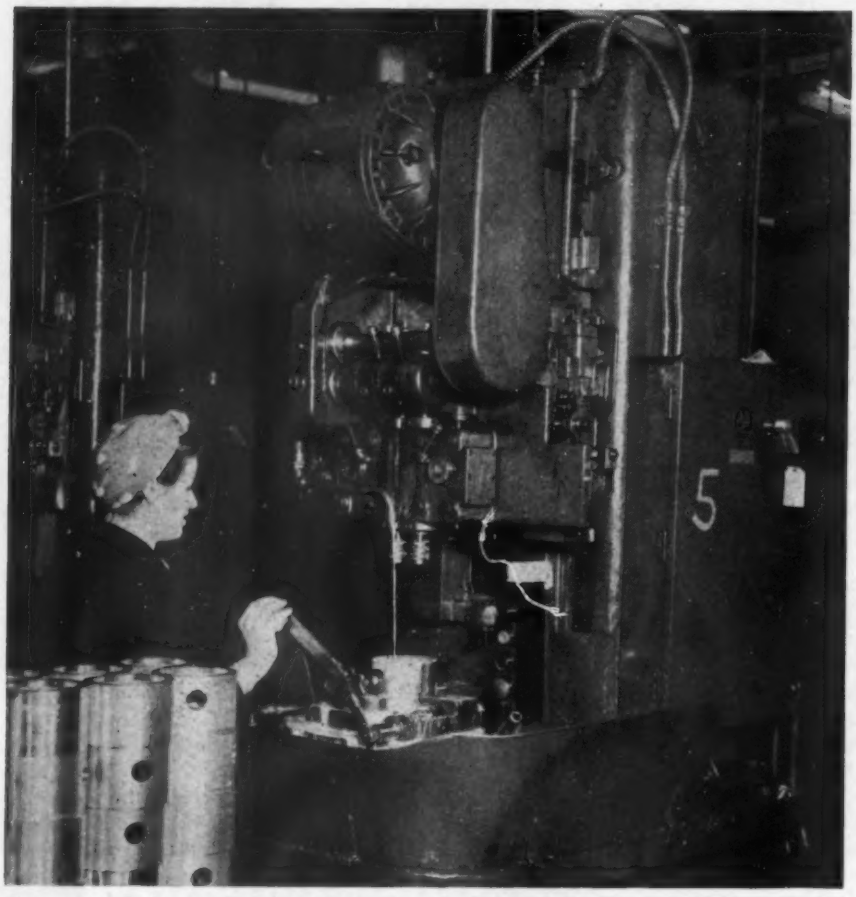
Trouble was experienced with the original cutters because of the unusual problems surrounding milling the fins in the piston skirt. Continuous cutting is impossible because of interference by the wristpin bosses. Fins are there-



Body of the fin-milling cutter is blanked on a press from SAE 1020 sheet stock. The die cuts the recess in each tooth, ready for depositing tungsten carbide



Space is so limited that if one cutter blade lets go, both cutter assemblies are usually ruined. Two-toothed blades are carburized all over to increase stiffness and extend cutter life



Because of the confined quarters in which the cutters must operate when milling cooling fins on the inside of the piston, the spindle slides must "expand" to the cut. Then the table rotates a part revolution forward, the same amount back, returns to a dead center, and the spindle slides contract and lift out of the work

fore disposed in two groups, and they are produced by milling nine circular grooves 0.137 in. wide by at least ¼ in. deep. Moreover the fins are only 0.005 in. thick. The opening between the wristpin bosses is insufficient to allow the use of a large cutter mounted on a heavy arbor; close spacing of the grooves and their depth combine to force the use of thin cutter blades which may flex and bind in the cut. Under the circumstances two cutter-blade assemblies, one for each pattern of grooves, can be used as well as one cutter, with a consequent gain in production. However, a special-purpose machine with the necessary movements and an automatic cycle is required.

The finning machine possesses two vertical spindles. These are mounted on separate slides. When the start button is tripped, the head rapid advances to the down position until it contacts a solid stop and a microswitch is tripped. Hydraulic cylinders then expand the slides to the cut at opposite sides of the piston. When the slides strike a solid stop, another microswitch is tripped, energizing an hydraulic circuit that imparts rotary motion to the table through a cylinder and split rack. The table rotates forward from dead center until plungers are pushed down by dogs on the rotating fixture to trip limit switches for reverse rotation. Rotation continues beyond center until plungers are again depressed, whereupon the fixture returns to the center position. The tool slides are then con-

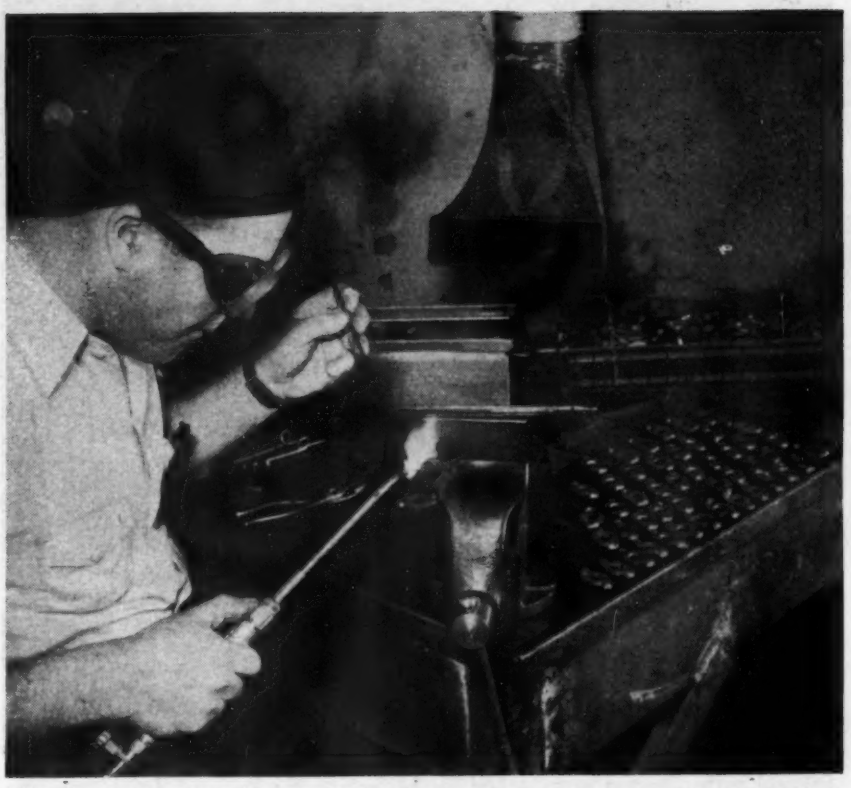
tracted and the head returns to the up position ready for another cycle. It should be noted that on the forward and backward motion of the table from center, an electric timer continues the cut for 1 or 2 sec. after a solid stop is reached, to insure completion of the cut before reversing.

The original cutter blades were high-speed steel, had six teeth and an integral spacing collar. To reduce the cutting load on each blade, every other tooth was removed. However breakage still occurred, usually through the keyway. If one blade only had broken the problem would not have been serious, but because of the confined space in which the tools operate both cutter assemblies were ordinarily ruined. Next step was to use a two-tooth cutter produced from sheet high-speed steel, with separate 0.005 in spacing collars provided to simplify tool manufacture. Excessive flexing of the thin blades was not overcome. Finally the current design of cutter was evolved.

Cost of the built-up cutter is low because of the material from which it is made and the production-line setup employed. The body is blanked from SAE 1020 sheet steel, including the recesses into which tungsten carbide is deposited by welding. Stiffness is imparted to the blade by carburizing, but the soft core absorbs shock and permits some flexing. The carburizing process also increases the strength of the weld deposit and its cutting ability. For the welding rod employed consists of a cold-rolled steel sheath in which is packed 240-screen tungsten carbide

Operations for Piston-Finning Cutter

1. Blank 2-blade cutter from SAE 1020 sheet steel.
2. Gas weld tungsten-carbide rod to recesses in tooth tips.
3. Dress the weld deposit on a silicon-carbide wheel, so that the cutter can be laid flat upon a surface-grinder chuck.
4. Surface grind both sides of the cutter to 0.020 in. of finished size.
5. Ream the arbor hole square with the sides of the cutter body.
6. Broach keyway square with the sides of the cutter (5 to 10 pieces at once).
7. Carburize to a depth of 0.040-0.050 in. all over and quench.
8. Remove surplus metal at cutting edge by hand grinding.
9. Surface grind to final thickness.
10. Circle grind to 1¾ in. diameter (30 blanks stacked on an arbor), the pieces being aligned approximately with a straight edge.
11. Grind the cutting edge, O.D. clearance, and side clearance on a tool grinder.



Welding rod consists of a cold-rolled steel sheath into which is packed tungsten-carbide powder that will pass through a 240-mesh screen. This degree of fineness has been found essential to a strong tip

Cutter bodies are surface ground to 0.020 in. of final size, preparatory to carburizing them to a depth of 0.040-0.050 in.

Several cutter bodies are stacked for broaching the keyway. To stagger the teeth in a cutter assembly, cutter bodies are made with the keyway at four locations as shown in the details on the tool drawing

powder. This size of particle is important. The sheath material is melted down into the weld deposit and the carburizing action produces a high-carbon steel which adds to the cutting value of the tip.

Cutter blades are produced with the keyway at four locations so that the teeth will be staggered when the blades are assembled on the arbor. Spacers 0.005 in. thick (blanked on a press and surface ground) are used between the cutter blades to achieve proper thickness of the fins. Cutter assemblies are set into go and not-go length gages to check the over-all length before release to the shop.

With this type of built-up cutter, strategic material is conserved and the monetary loss does not amount to a great deal if a set of cutters is broken. Only a few people are engaged in their production, and most of the machine operators are women.

Other piston-machining operations are done upon general-purpose machines by methods comparable to those used in other engine building plants. The tooling problems are concerned with meeting standards or finish and dimensions and keeping scrap to a minimum. Cutting the ring grooves for example is not done on special-pur-

Thirty cutters are loaded on the arbor for circle grinding. This operation removes excess material, assists grinding the clearance in a later step, thereby reducing the load on grinders sharpening new and worn cutters

The Chevrolet two-tooth fin-milling cutter gives 400 pistons per grind, or twice the number of pieces per sharpening for the original six-tooth high-speed steel cutter and is less likely to break in service

pose machine tools but the sequence of operations has been developed from observations of the effect of heat upon maintenance of dimensions for which the limits are tenths, not thousandths as in automotive piston manuacture. Tipped tools, using tungsten-carbide inserts, are produced in the toolroom on a semi-production basis for use on the ring-grooving machines.

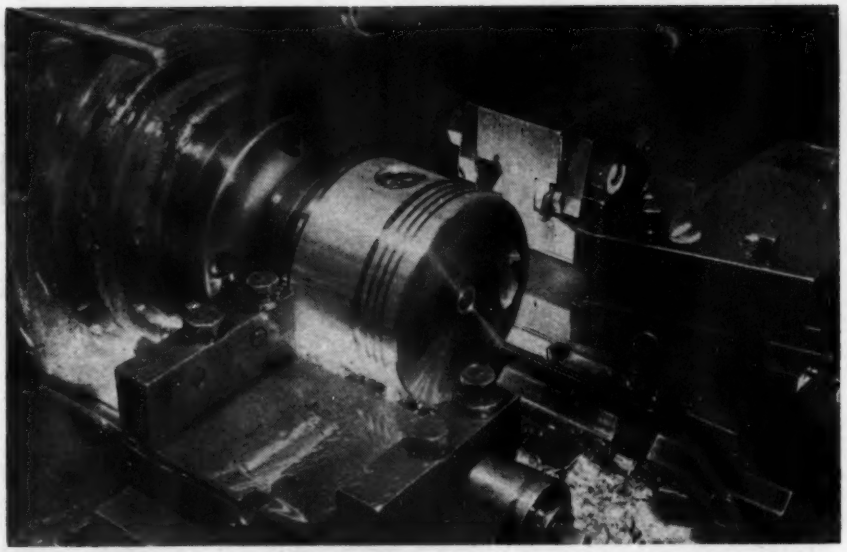
Piston-ring grooving is divided between two operations. The three top grooves (0.104 in. wide and with sides tapered 2 deg.) are machined along with finish turning the O.D. and facing the head. As performed on a turret lathe, automatic cycle is as follows: (1) the front tool block moves to the left to turn the O.D. (2) at the proper instant the rear tool block feeds in to face the head, (3) as the turning tool clears the piston skirt, the front toolblock feeds in to rough the three top ring grooves, and (4) continued travel of the rear toolblock causes three finishing tools to complete the ring grooves. The 2-deg. taper on the sides of the grooves provides a sensitive method of checking the width. If oversize by 0.0001 in. measuring pins will enter the grooves too far.

When the piston has had an opportunity to cool, the two lower ring grooves are cut. It is inadvisable to combine this operation with the preceding sequence because the heat of turning causes unequal contraction of the metal, and hence inaccuracies in the lower grooves. These tapered grooves are held to a limit of 0.0002 in., which means that the width of the cemented-carbide tools must be held to 0.0001 in. The piston is held on a heavy fixture applied to the spindle of an automatic lathe, and operated by an air cylinder. Pins engage wristpin holes in the part and draw it back firmly upon a pilot entering the counterbored skirt. Two carbide-tipped tools, fitted in the rear toolblock (other toolblocks are inoperative), are fed in the depth. Tools for the 0.2215 in. groove are made 0.2217-0.2218 in. wide to obtain a groove that is not too loose after the metal closes in. All features of the setup must combine to produce the required accuracy and avoid nicks and drawback scratches.

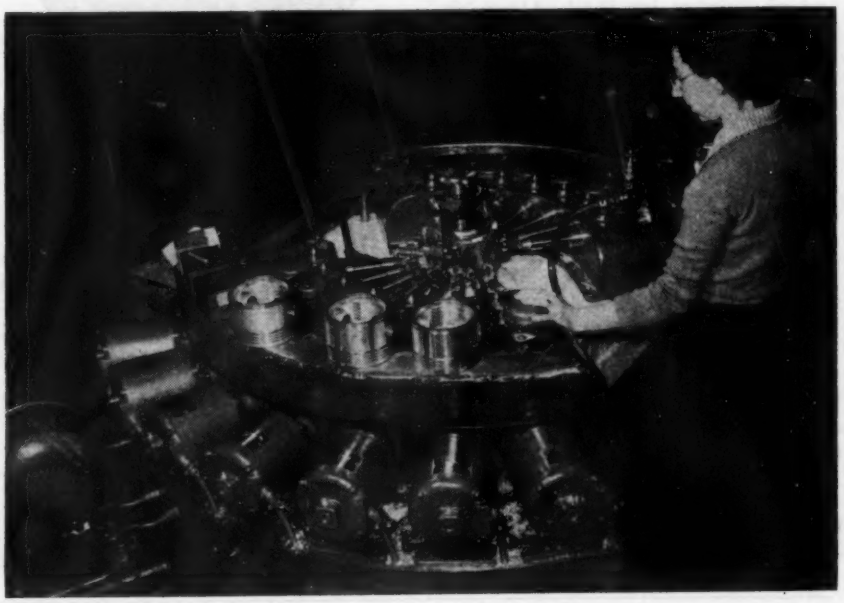
To speed the drilling of oil-return holes in the Pratt & Whitney piston, Chevrolet has installed automatic-cycle, multiple-spindle drilling machines. One of these special machines drills fourteen holes, in two groups of seven, the holes in each group being uniformly spaced 15 deg. apart. The operator places the piston in the pot fixture, clamps the fixture leaf and presses a starting button. All spindles then automatically feed forward simultaneously to depth and return to the stop position, whereupon the operator removes the piston and inserts another. Production obtained is 200 pieces per hour.

All spindles of the special machine are ball-bearing mounted and individually driven by motor. Speed changes can be obtained by changing sheaves. Quills are actuated through a combination of hydraulic and gear elements. A large gear sector in the base is actuated by an hydraulic cyclinder to obtain the desired length of feed stroke. Shafts with gears at each end transmit motion from the sector to the quills, the top pinion on each shaft meshing directly with the rack cut into its mating quill.

These are perhaps the outstanding applications of special-purpose equipment and high-production tooling to the Pratt & Whitney piston. They serve to illustrate the tooling techniques that Chevrolet master mechanics and tool engineers have been able to develop despite a new product involving hundreds of high-precision parts and frequent revisions in manufacturing schedules.



The lower two ring grooves are machined in a separate set-up to avoid distortion. Again the piston is pulled back onto the fixture pilot by an air-operated drawbar



Fourteen oil-return holes are drilled in the bottom groove, after the piston has cooled from the previous operation. The high-production drilling machine machine conserves floorspace, can turn out 200 pistons per hour

War Industries May Alter South Africa's Peacetime Economy

BY BENJAMIN W. CORRADO, ASSOCIATE EDITOR, AMERICAN MACHINIST

UNDER the impetus of war, the Union of South Africa has advanced industrially over the past three years the equivalent of 25 peacetime years. The job is largely a tribute to South African resourcefulness. But the help of imported American and British tools, totaling over $4,000,000 in value since September, 1939, played an important part.

In commenting of this swift development, Dr. van der Bijl, director general of supplies for South Africa, recently said, "Our rocketing targets of production have called for more and more machines, and despite our ingenuity and improvising wherever possible, Great Britain and America have been called upon for a great many machine tools and cutting tools. We have received many, some of them have literally broken bottlenecks which were hindering production. We have been able to assure America that the machines they send us are not standing idle—most of them are in use 24 hours a day. Where possible machines have been made in the Union, but much is beyond our capacity and we still look to America for her continued assistance."

The wartime transformation has been remarkable.

Its wartime industrialization, helped by American and British tools, provides sound postwar opportunities for South Africa regardless of the gold standard

When South Africa entered the war on September 4, 1939, she had only three factories equipped to turn out war material. In two years, she had over 600 war plants; employment more than doubled from 352,500 in 1939 to about 741,600 in early 1943. Today, South Africa is producing ammunition of many types, is assembling military vehicles from imported chassis and engines with South African designed and built bodies, and is making certain types of machine tools, diamond tools, foundry machinery, electric motors and welding equipment.

At the outset, the area's engineering workshops were all maintenance shops, and these facilities had to form the basis for the Dominion's war industries. The gold-mining industry and the railroad and harbor systems had required sizable engineering, repair and constructional shops. Moreover, the gold mines had been served by a big explosive industry, including one of the largest plants of its kind in the world.

To attain mass production of munitions, the government took a census of machine tools at the outbreak of the war, and then assembled those needed in larger and more centralized plants. Then it depended upon its technicians and engineers for problems which could not be solved by importing equipment within the required time. The technicians came through. In six months, facilities were laid out to produce howitzers and a shell-forging plant was built and put in operation. Moreover, a delicate gunsight was developed and placed in mass production, being turned out so successfully that orders for the British government are being handled, as well.

The State-controlled South African Railways and Harbours is the largest organization in the Union. One of its biggest shops converted 80 percent of its work to war, and most of these shops shifted from an 8-hour to a 12-hour day. Today, most of its 130,000 employees are busily engaged turning out gun and mortar parts, gun carriages, fuzes, bombs, gun sights, army vehicle bodies, light and power supplies, and even handling urgent shipping repairs.

Meanwhile, gold mine workshops were turning out anti-tank guns, bombs, and shells, without reducing the vital output of gold. In recent

Table I — Vital Statistics on South Africa

Area: 472,550 sq. miles. One-sixth that of the United States.
Population:
- 2,230,000 Whites
- 7,377,000 Blacks
- 845,000 Mulattos
- 278,000 Indians
- 10,730,000 Total

Industrial employment: 741,600, white and non-white.
In Armed Forces: 215,000 whites; 102,000 non-whites.
Part-time Women Auxiliaries: 65,000 whites.
1940 Motor Vehicle Registrations:
- 317,958 cars and taxis
- 51,215 buses, trucks, etc.
- 1,044 tractors
- 370,217 total

Motorcycles in use 1940: 21,725
Miles of road: 88,591
Railway mileage: 13,645
Rolling stock:
- 2,276 steam locomotives
- 178 electric locomotives
- 4,746 coaches
- 53,236 freight cars

Number of bridges: 2,363
Telephones in use: 202,753
Radio listeners licenses: 283,119 (includes speaker extensions from master radios in hotels, apartments, etc.)
Annual Steel Capacity: 700,000 Tons
Approximate Steel Imports: 500,000 Tons
Annual Coal Output: 20,000,000 Tons
Annual Gold Output: $490,000,000 or 14,000,000 ozs.
Form of Government: Dominion in British Commonwealth of Nations

years, gold-mining provided half of South Africa's national income.

But the Union's output of munitions thus far (See Table II) only tells half the story. Present production rates of many items are substantially above those of recent years. For example, monthly output of small arms ammunition is now around 20,000,000 rounds, as against 4,000,000 in 1941; mortar bomb production is now about 100,000 monthly, an annual rate equal to total output from 1940 to 1943. Moreover, many schedules have been increased further, although a few have been cut.

One increased schedule is for 1,000-lb. aircraft bombs, which is the largest size the Union produces. Since this required a large increase in plant floor space, an entire steel-framed building with a floor space of almost an acre was requisitioned. It had been used to wash, sort and grade diamond-bearing gravels mined nearby. The diamond mine was closed, the plant dismantled and then transported by truck and rail about a thousand miles to the location of the major plant producing the large bombs. There the new plant was erected around the old one, which was kept in operation throughout. When the new building was assembled, the walls of the old one were pulled down and the latter plant formed the nucleus of a larger production line, part of which was equipped with South African made machine tools.

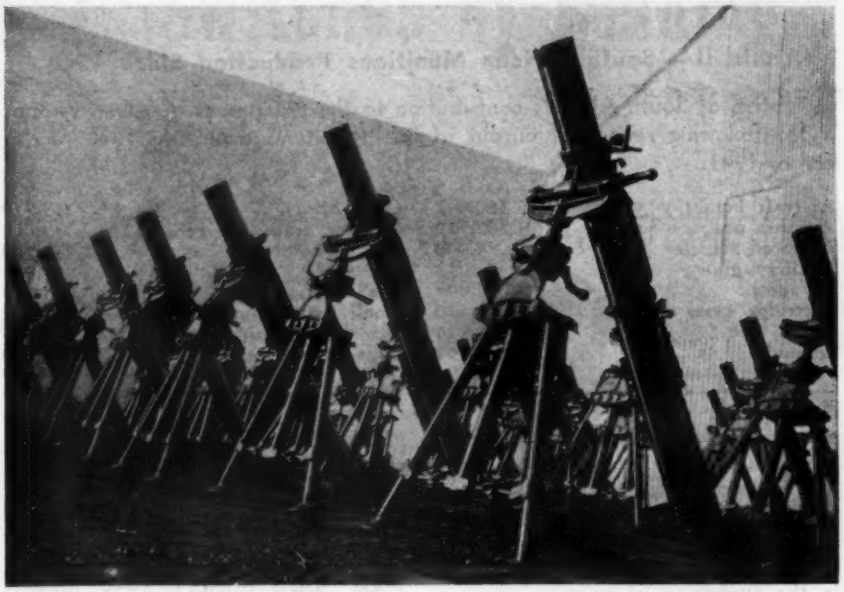
The war-born South African machine tool industry was started in Johannesburg, making shell-turning lathes, bullet-piercing and bullet-assembling machines, foundry machinery and some special units. Moreover, with the aid of domestic diamond production, a diamond tool manufacturing industry was created, now producing turning and boring tools, thread-grinder dressing tools, glass cutters, optical drills and lens cutters. Another new industry has been electric motor manufacture, being produced in a range from ¼ hp. to 400 hp.—thousands of these have already been exported to the Middle East. In addition, generating machinery for spot and arc welding is being turned out.

This activity had a substantial impact on South Africa's steel industry. The capacity of 400,000 tons has been expanded to about 700,000 tons, of which about 95 percent is controlled by the South African Iron & Steel Corporation, Limited, 90 percent government owned but privately operated. Yet, import needs still approximate the pre-war level of about 500,000 tons, mostly from Great Britain with some coming from the United States.

The steel industry is supplied by large deposits of high-grade Haematite iron ore, averaging 65-67 percent Fe, extensive coal deposits, and chromite and manganese mines. Finishing facilities are fairly well balanced, including plate, sheet, bar, and structural mills. A wire-drawing and fabricating plant is planned after the war.

Today this industry is turning out tool steel, armor-piercing shell steel, manganese steel for helmets and producing gun barrels, bombs and armor-plate. Moreover, aided by castings from the Union's foundries, it has made possible the tripling of farm machinery output from 4,000 tons in 1942 to 12,000 tons in 1943, to help increase food production.

To support this expansion in war and essential civilian production, the small skilled labor force had to be increased. To do this, a Central Organization for Technical Training was set up to provide intensive technical training for 3,000 men every six months. Each volunteer for this program agrees



South African made mortars lined up for inspection. The Union has produced thousands of them and over a million mortar bombs

Turning the barrel of a light weapon in a South African factory. Around-the-clock use of the Dominion's machine tools, most of which originally came from its mine and railway repair and maintenance shops, later being increased by imports and domestic production, has more than doubled the number of machine operators in the Union. Moreover, there are over 10,000 women working in South African industrial plants today

Table II — South African Munitions Production Since 1940

Indicative of South Africa's contribution to the equipment of Allied Armies is the following record of output of selected items from late 1940 to the Fall of 1943:

Aircraft bombs	380,947	Land Mines	215,816
Aircraft practice bombs	1,207,759	Military transport vehicles	32,000
Armored vehicles	4,900	Mortar bombs	1,234,740
Artillery guns	232	Mortars	9,014
Bayonets	14,094	Shell bodies	2,005,499
Cartridge cases	1,560,530	Small arms ammunition	392,388,102
Fuzes	1,993,153	Spare parts—aircraft	2,107,000
Grenades	1,243,193	Spare parts—vehicles	1,250,000

to serve either with a military technical unit or in war production for four years or until the end of the war, whichever is shorter. The plan has the cooperation of the trade unions.

To stimulate new industries and aid in the expansion of existing ones, an Industrial Development Corporation was set up in May, 1940, with a capital of $20,000,000 to extend financial aid to business. Thus far, the IDC has helped establish a plastics industry, an animal feed industry, a heavy engineering industry, a paper industry, and a cotton and wool textile industry.

Post-War Implications and Prospects

South Africa was early with post-war planning and thinking. In 1941, a cabinet committee was appointed to deal with post-war reconstruction, and in March, 1942, a Social and Economic Planning Council was set up to deal with the broad problems involved. It has invited industry plans and suggestions. In addition, a Civil Re-employment Board was established to handle the return of men and women to civil life from the military forces.

In recent months, the Union's D.G.S. (Director General of Supplies), equivalent to the War Production Board here, permitted the limited manufacture of certain civilian type items in short supply. These included farm equipment, motors, electrical wiring, plugs, and switches, metal screws and rubber.

It is important to note that before the war the United States was South Africa's second best customer with Great Britain being the first. The Union was the largest overseas buyer of American automobiles, and two American companies had established assembly plants there. Other major imports from the United States included motor vehicle chassis and parts, machinery and industrial equipment, miscellaneous metal products and clothing. Shipments to the United States included mostly wool, hides, asbestos, diamonds, chromite, and manganese. Recent export-import relationship with the United States was:

	Exports to U. S. (Excluding gold)	*Imports from U. S.*
1939	$10,500,000	$ 70,000,000
1940	47,000,000	104,000,000

Of South Africa's 1939 imports from the United States, 31 percent consisted of automotive products, 20 percent of machinery and industrial equipment, and 5 percent of miscellaneous metal manufactures. No similar breakdown is available of the 1940 figure, which was the last made public. While this latter figure may seem small in the light of over-all United States exports, the expansion of South African industry over the past four years presages much greater requirements in the nature of industrial equipment and even manufactured goods. After all, the Union's gross value of its manufactured products has probably more than doubled from its 1939 level of $800,000,000, national income has risen considerably, and technically trained labor has greatly increased, all factors tending to support a more industrialized nation in the post war years.

Publicly mentioned post war plans include locomotive manufacture, fabrication of steel wire and wire products, and possible development of the Union's own navy. Moreover, aviation should play an important role in South Africa, since it had embarked on a broad civil aviation program before the war and since the war has conducted a "Help Aviation" movement which gives simple technical instruction to young boys and girls.

In view of the importance of gold to the South African economy, and discussions of possible dispensing with gold in international trade after the war, the Union must of a necessity look to the time when it may have to convert a substantial part of its industrial economy away from gold mining. If and when the time comes, the rich natural deposits of coal, iron ore, manganese, chrome and copper, should prove invaluable, as well as its agricultural resources. Another asset to industrial development are its low power costs.

This natural wealth should enable the Union to maintain a sound international position regardless of the status of gold. Moreover, its favorable geographical position in relation to developing world markets in the Near East and Far East should also prove helpful. More than that, the Union's steel industry (the only one on the continent of Africa) and its high degree of industrialization in general should give South Africa a leading role in pan-African relationships and trade.

Assembling an ambulance, over a thousand of which have been built in South African plants from domestically designed and constructed bodies and imported chassis. Almost 36,000 other vehicles have also been turned out, all the way from armored vehicles to trucks and troop carriers

Railroad Repairs Switches by Welding

BY ARTHUR HAVENS, WELDING SUPERVISOR, RUTLAND RAILROAD

Because repairs with new parts averaged more than the cost of a new switch, the Rutland now welds worn parts, building them up to their original dimensions

THOUSANDS OF SWITCH STANDS are repaired each year by American railroads, usually by replacing worn parts with new ones. It is not uncommon to find that the cost of the new part plus labor charges is more than the cost of a new stand. We discovered this to be true on our railroad and turned to gas welding to reclaim the worn parts. Our saving over the cost of a new No. 17 switch stand shown in Fig. 1, is $32. The procedure for making the repairs is as follows:

The base of the stand is welded first. Probably the most frequent defect found here is the loss of one or both of the cast safety lugs that protect the crank eye from turning too far in either direction. Since the base is cast iron, the lugs are built back in place, using a good grade of cast-iron rod and the oxyacetylene flame as shown in Fig. 2. The lug is built to desired height and shape with the base laying in a flat position. The base is then turned first on one side and then on the other, and the proper thickness added to the lug. No preheating or reheating is needed for this operation.

The next item in the repair and welding sequence is the safety block. The female square opening in this block, shown in Fig. 3, registers with the male square on the outer sleeve of the stand when the switch is closed. The male and female members of this part of the switch seldom register during the closing of the switch; consequently, the corners of the square hole in the safety block are generally worn severely. For welding, the safety block is fixed on a bench or in a suitable jig in a horizontal position with one side of the square perfectly flat. When the safety block is preheated sufficiently, either by torch or in a furnace, the unworn part of the square surface is used as a guide to weld up the worn portion with cast-iron rod. If extreme caution is exercised, the built-up surfaces need not be filed to fit the male square on the outer sleeve.

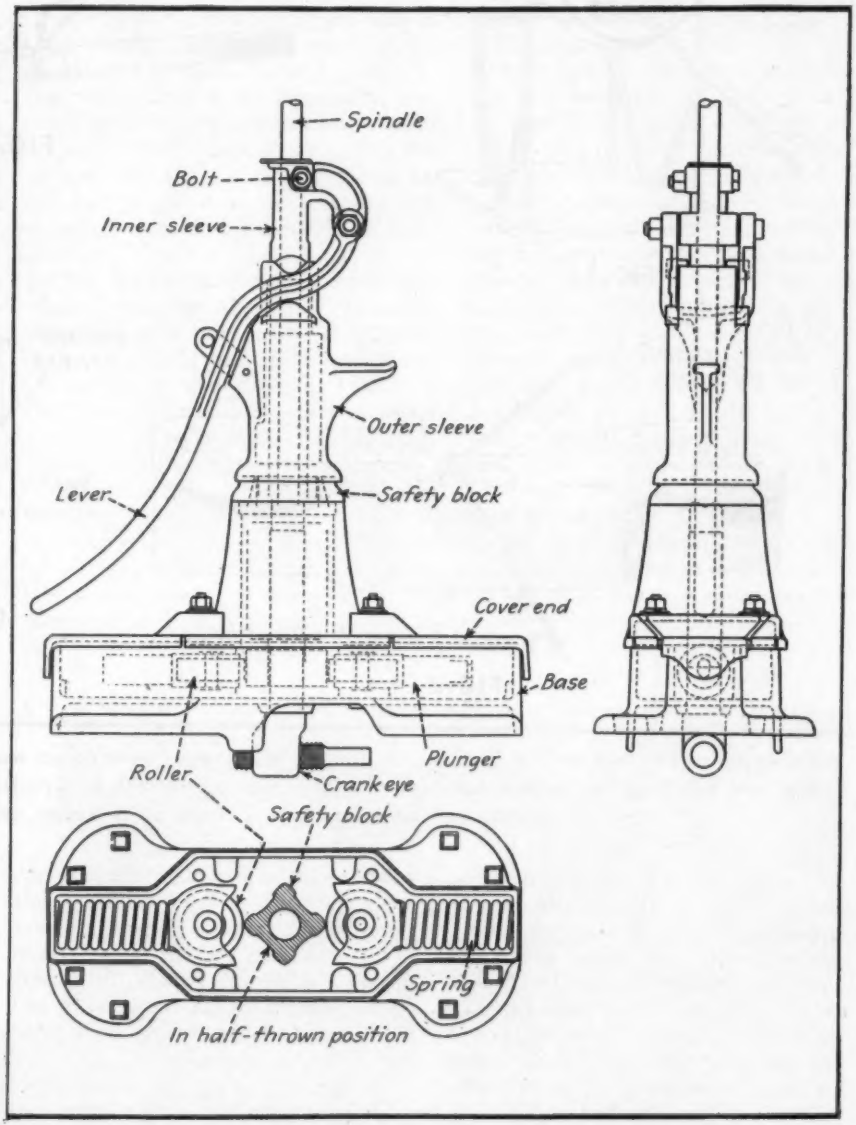
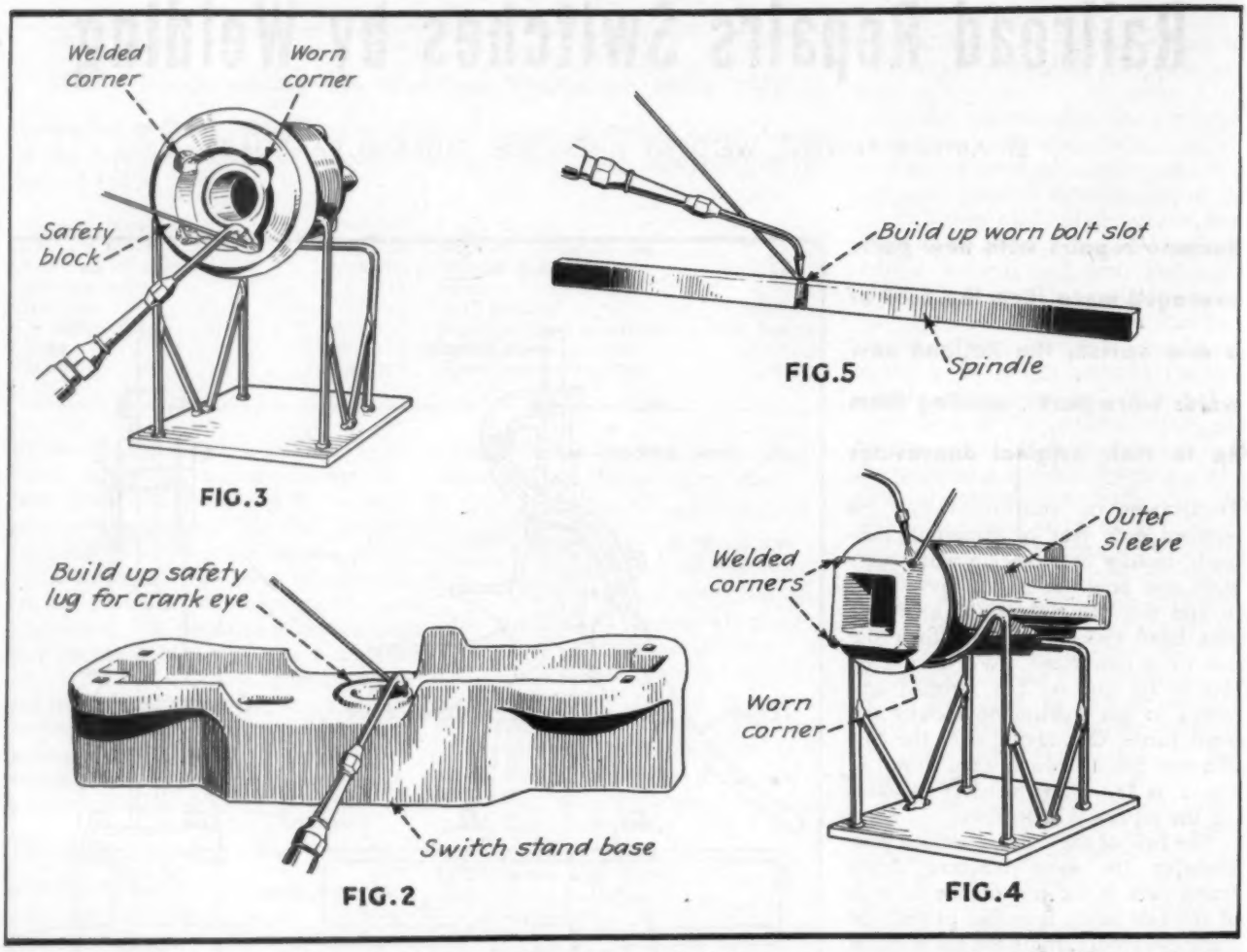


Fig. 1—Repairs to this type switch can be made by gas welding rather than replacing worn parts with new ones. Besides avoiding delays in waiting for new parts, this practice effects lower maintenance costs

When all four flat surfaces of the safety block have been welded, the outer sleeve is set up on the bench or in the same jig, as shown in Fig. 4, and welded in a like manner. Great care need not be exercised in welding the male square on the outer sleeve, since the welded surfaces can be ground with a portable grinder.

As a rule, the inner sleeve does not wear severely; therefore, it does not require welding. Cracked or broken cover plates are welded or rebuilt where needed with cast-iron rods. Usually this means building back a broken corner, or welding a crack across the plate at the bolt holes. When the lock hole on the outer sleeve is worn, it is filled with mild-steel rod and drilled to the desired size.

The next major step is to fill the bolt slot in the spindle with mild-steel



Welding of safety lugs on the switch base for the crank eye, building up worn areas on the safety block and outer sleeve, and filling up the spindle bolt slot are the major operations in repairing the No. 17 switch stand. Complete repairs can be made in 2½ hours by a welder and his helper

rod, using the oxyacetylene flame as shown in Fig. 5. The spindle must be supported to prevent sagging during this operation, and when welding is completed the spindle must be checked for straightness. This should be all the welding required, with the exception of some small adjustment when the stand is assembled. This and other adjustments are described later.

Assembly of Welded Parts

After the outside sleeve is fitted into the safety block, the plungers are slipped into the springs and the assembly placed in the base. The springs are compressed with bolts provided for this purpose, and the reconditioned safety block is dropped into place in the cover plate. The springs are then released, holding the safety block in place.

Excess metal is ground from the welded bolt slot on the spindle, and the spindle is inserted into position in the stand. The inside sleeve is then slid into place and held against the top of the safety block. While in this position, the repair man should scribe a line at the top end of the inside sleeve on the spindle. The inside sleeve is then removed and the spindle taken out of the stand. Finally, the inside sleeve is replaced on the spindle and the assembly taken to the drill press for drilling a new bolt slot.

At the drill press, the inside sleeve is slid down on the spindle until it is 1/16 in. below the scribed mark, and it is clamped there. The spindle and inside sleeve are fastened to the bed of the drill press, and a new bolt slot drilled in the spindle by drilling through the ¾ in. bolt hole in the inside sleeve.

The spindle is replaced in the stand, the outside sleeve placed on the spindle, and the inside sleeve slid down until the hole in the sleeve registers with the bolt slot in the spindle. A ¾×3½ in. bolt is driven into the locking bolt hole. Allowing the 1/16 in. draw on the spindle bolt should tighten the switch stand mechanism comparable to that in a new stand. Should this make the stand too tight, it is a simple matter to remove the inside sleeve and file or grind a small amount from the bottom of the sleeve at the safety block bearing. When this operation is completed, the handle is added to the stand, cotter pin holes are drilled in both the locking bolt and the handle bolt, and keys are inserted. This completes work on the stand except for the addition of oil or grease.

Repairs Save $32 per Switch

Some railroads recommend the application of new crank eyes on all repaired stands. Doubtlessly the crank eyes should be checked for wear, as should the crank eye threads in the spindle.

The repairs herein described can be made by one welder and a helper in 2½ hours. Labor charges are the greatest expense in this repair, since the cost of materials is minor. On our road, such repairs not only saves $32 per stand, but it also eliminates the use of new parts that are so hard to procure from manufacturers under present wartime conditions.

Bedding-in Lathe Carriages by Power

BEDDING-IN and aligning big engine lathe carriages at the Monarch Machine Tool Company is now done by a power-driven device which materially reduces manpower required for the job. The operation consists of moving the lathe carriage back and forth the length of the lathe ways, determining the bearing spots and scraping these so that when the job is finished the carriage will run smoothly along the lathe bed and in accurate alignment with the headstock. In the past the job required two men, a scraper and his helper, plus the the assistance of four or five men to slide the carriage back and forth.

Since the bed ways must be coated with red lead, rather than lubricated, and the carriages weigh in the neighborhood of 1800 lb. for the larger lathes, the simple operation of moving the carriage from end to end of the lathe bed is one requiring considerable expenditure of physical energy. Approximately three trips are made with the carriage between each scraping operation. An overhead crane is used to remove the carriage while the bearing points on the lathe bed are scraped.

The over-all operation of bedding-in and aligning carriage averages between five and six hours and requires 15 or 16 separate cycles of moving the carriage back and forth over the lathe ways. Each time the several men concerned with the moving end of the job must interrupt whatever other work they are doing.

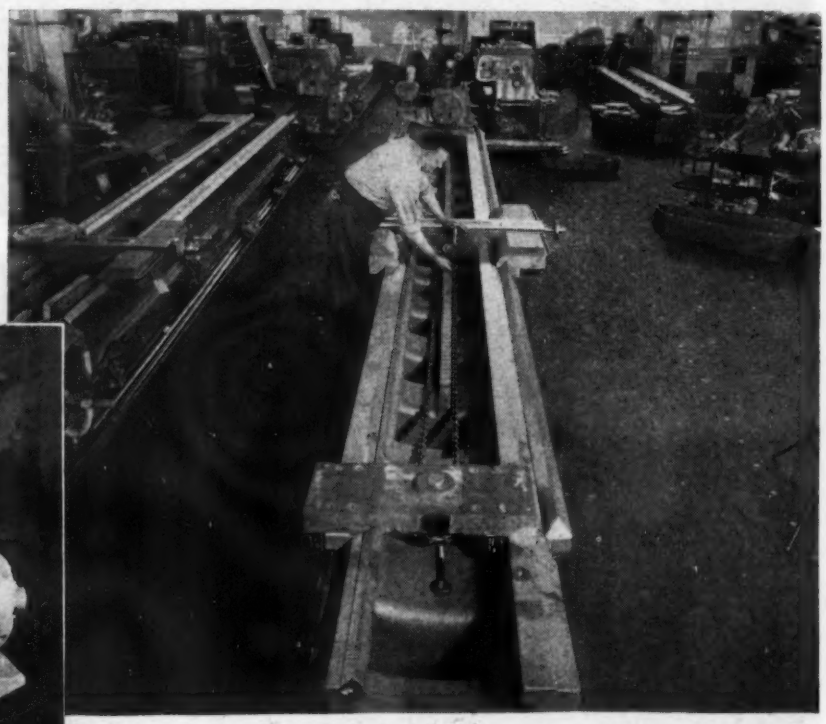
With the power-driven equipment now used only two men, the scraper and his assistant are required to handle the whole bedding-in operation. Moreover, this second man now has the opportunity of understudying the scraper and actually performing many of the scraping operations himself. Immediate result is that it has been found possible with the new arrangement to train a number of understudies for the scraper and after a week or two as assistants to put them on scraping and aligning work almost entirely on their own.

The device consists of a continuous chain running between sprockets mounted in fixtures clamped at either end of the lathe bed. For convenience in applying the drive to different length lathe beds the continuous chain has been made with several 4-ft. multiples, each having an opened link.

A hole in the side of the lathe carriage to take a follow rest is used to hold a simple fixture through which a pin is dropped to tie the carriage to the moving chain. A wedge holds the chain securely to the pin. Power to drive the chain is supplied by a 1½-hp. electric motor connected through a speed reducer to one of Monarch's regular rapid traverse drive units, slightly modified for the purpose.

The regular drive shaft of the rapid traverse unit has been replaced with a shaft to one end of which a chain sprocket is attached. Complete with clutch and reversing mechanism, and controlled through a handle which replaces the usual shifter link, the rapid traverse unit has been mounted vertically on a plate together with speed reduction gears and motor. This plate is equipped with clamps which permit the device to be easily attached to any one of several sizes of large lathe beds currently in production. As a safety precaution, a clutch in the rapid traverse drive is so adjusted that it will slip if the carriage should arrive at either end of its travel without being reversed or stopped by the operator.

The chain sprocket at the far end of the bed is mounted on a short shaft in anti-friction bearing from a plate which is readily clamped on any one of several widths of lathe beds.



Continuous chain is attached to lathe carriage by means of simple pin and wedge fixture bolted to follow rest position on carriage side

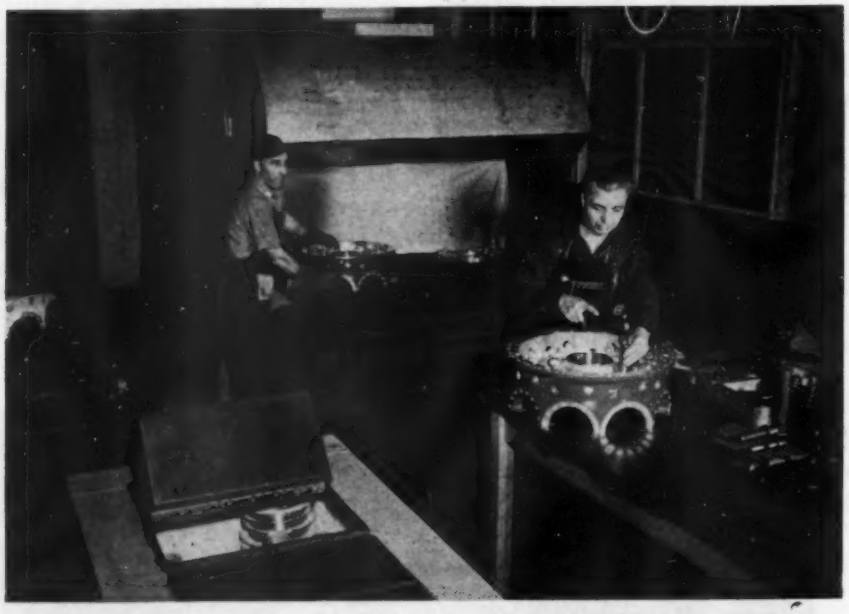
Normally mounted horizontally along the rear of a lathe bed, this rapid traverse unit has been combined with motor and speed reducer to provide power for "bedding-in" operation

SHOP SHOTS

FROM AN AIRCRAFT ENGINE PLANT

War goods now being made by the various plants of the Nash-Kelvinator Corporation differ considerably from the regular peacetime products of those plants. It has been the policy of the corporation, each time it has undertaken a new war contract, to follow the methods and production techniques of established manufacturers of the required products. In so doing, Nash-Kelvinator has benefited from the accumulated experience of the original makers who, in each case, have cooperated to the fullest possible extent.

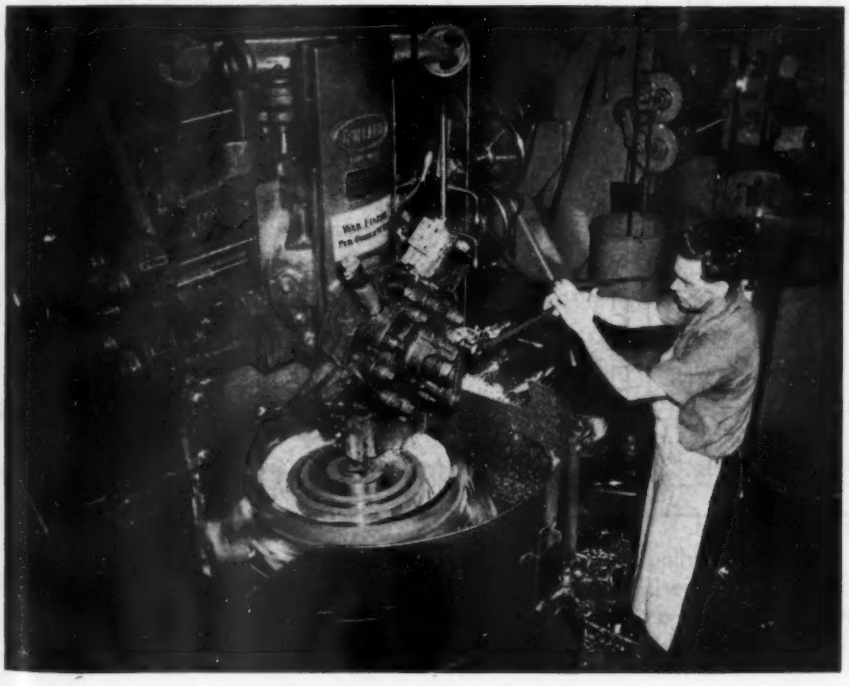
The experience of Nash-Kelvinator executives, manufacturing engineers and other operating personnel with mass-production techniques has resulted in making a number of improvements or "short cuts" in manufacturing procedures. Such has been the case at the plant of the Nash Motors Division, which have undertaken to make large radial Pratt & Whitney aircraft engines for the U.S. Navy. On these two pages are shown a few of the improvements developed at that plant.



By moving bushing assembly operations into the paint shop, Nash Motors has been able to take advantage of the fact that engine castings, as they come out of the paint drying ovens, are at approximately the proper temperature for bushing and liner insertion. This set-up does away with the necessity of masking the bushings and liners before painting, and eliminates a number of large ovens. Previously one set of ovens was required to dry the paint and a second set to heat the castings for insertion of the bushings and liners. These parts are refrigerated before being put in place

Stud driving has always been a tedious job in aircraft engine plants because most of them must be driven by hand in order to insure proper fits. Nash Motors has succeeded in mechanizing this operation for most of the 1176 studs in each engine. Time saving with the set-up is about 90 percent, and because of the efficiency of the mechanized drivers subsequent torsion tests show almost 100 percent accuracy of driving. The savings amount to about $19,000 a month at current production. A turret stop limits the stroke of the motor slide for different stud lengths

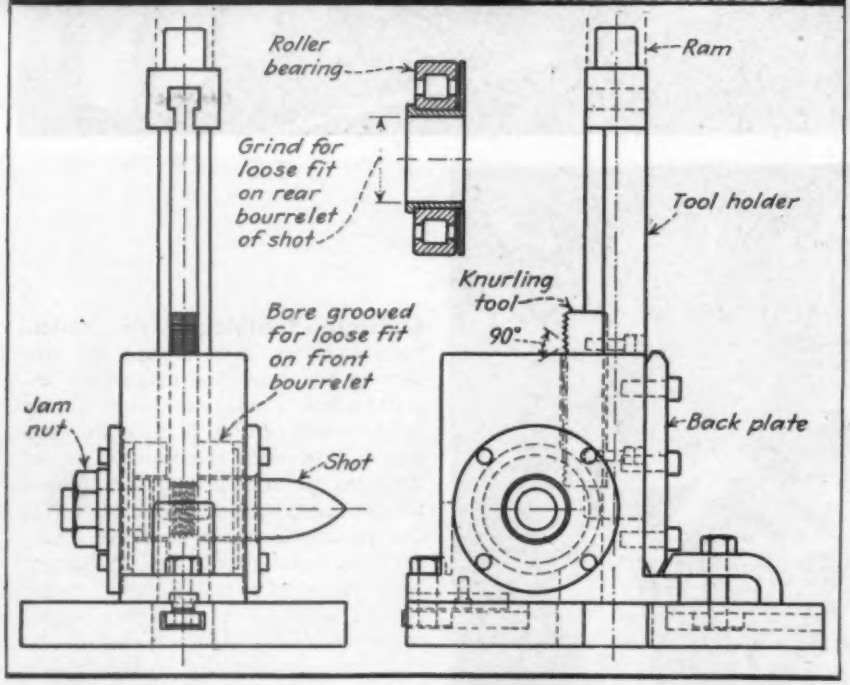
Fixtures for silver soldering operations have made possible a saving of 50 percent in the amount of silver solder wire required and have accelerated production considerably. Nine special fixtures have been designed to hold the various pieces firmly and permit rotation of the work evenly by foot control. The solder wire is fed into the torch flame from a spool, instead of in stick form. Drive units for the silver soldering fixtures consists of an air drill motor connected to a speed reducing gear box set under the soldering bench. The operator conveniently controls rotation of the work with the foot valve set on the floor in front of the bench



Multiple toolblocks on Bullard vertical turret lathe set-ups for machining aluminum and magnesium aircraft engine castings save time. On the main blower casting, Nash Motors has found it possible to eliminate five of the eight machines originally employed for the first machining operation. On the remaining three machines, they have increased production 35 percent by giving careful consideration to the tooling and to the machining speeds employed. The toolblock shown carries five single-point carbide-tipped tools for machining four surfaces in one pass

Fixture Speeds Knurling Of 37-mm. A.P. Shot

BY M. A. BECKMANN, VICE PRESIDENT, ALUMINUM INDUSTRIES, INCORPORATED



This fixture holds 37-mm. armor piercing shot while knurling the band groove. The shot rotates freely in bushings fitted with roller bearings as the knurling tool, mounted on a holder screwed into the ram of a 1½-ton hydraulic press, traverses the groove

A RACK-TYPE knurling fixture, basically similar to a surface broaching fixture, made it possible for Aluminum Industries, Incorporated, to get into production rapidly on a large order for 37-mm. armor piercing shot for the U. S. Army. The fixture was built because early delivery of a shell knurling machine could not be obtained, and turret lathes used for other operations on the shot did not have sufficient capacity for the knurling operation.

The fixture was designed for use in a 1½-ton Logansport bench-type hydraulic press. Most of the parts are made of cold-rolled steel, pack hardened and ground to size. The knurling tool is 4.188 in. long and has 40 teeth cut on 0.10485 in. centers across its top face. It is made of die steel and was hardened carefully to withstand the knurling pressure. The teeth were ground from the solid after the part had been hardened. This tool is carried in a vertical holder that is attached to the ram of the press and is guided in the housing of the fixture. The drawing shows the knurling tool and holder in their uppermost position. At the bottom of the stroke, the holder extends about 2 in. below the bottom of the platen, and the knurling tool clears the workpiece so that it can be removed before returning the ram.

The workpiece when in position for knurling is supported in hardened bushings fitted in standard heavy-duty roller bearings, and is located by a flat-point setscrew which contacts the base end of the shot. The use of roller bearings insures freedom of rotation for the shot when it is contacted by the knurling tool. There is no retarding force which might cause the shot to stick in the holder. Cleanly knurled band grooves thus were produced without difficulty.

In using this device, the woman operator merely selects a shot from a tote pan on the workbench, inserts it in the fixture, and then operates the control valve of the press with her other hand. Operation of the press is rapid, and the largest part of the work cycle is taken up with placing and removing the shot from the fixture.

Free Enterprise

. . . INCENTIVES AND TAXATION

There are three principal ways of making a living:

1. Getting on someone's payroll
2. Lending one's savings to business enterprises
3. Starting, or helping to start, a business enterprise

About three out of four of us fall in the first group—we are ***job-holders.*** Millions of us get some income, large or small, by lending our savings—directly or through such channels as insurance companies. We are suppliers of ***loan-capital.*** About one out of four of us has his own business enterprise, and several millions of us are part owners of business enterprises. Those of us who go into business for ourselves and those of us who are part owners of enterprises are ***job-givers.***

The amount of employment in a community depends, in the main, on the number of persons who attempt to make their living, or part of their living, by giving jobs to others, rather than by getting on someone's payroll. A community seriously desiring a high level of employment and a high standard of living will strive to make job-giving attractive and to encourage a large part of its population to be job-givers rather than merely job-holders.

The number of men who attempt to make their living in whole or in part by starting new businesses or by expanding old ones depends upon the outlook for profits. When the outlook for profits improves, thousands of new jobs open up and thousands of men go to work; and, as men go to work, the farmer and everybody else benefits. When the prospect for profits becomes darker, the demand for labor, capital, and raw materials drops. It may be roughly estimated that an improvement in the prospect for profits of one billion dollars raises the demand for labor by anywhere from two billion dollars to five billion dollars.

One of the principal determinants of the outlook for profits is the amount and the nature of taxes. After the war, the Federal government will need to raise each year about twenty billion dollars in taxes—three times the amount required before the war, and six times the amount re-

quired in the Twenties. In the Twenties, the tax needs of the Federal government were roughly twice as large as corporate profits in a good year. After the war, Federal revenue needs will be roughly three times corporate profits in a good year. Obviously, it will be much more difficult, after the war, for the government to meet its needs *without discouraging enterprise,* and therefore without diminishing the number of jobs, than it was before the war. Far more than ever before, it will be necessary for the government in developing a tax program to take account of the effect of taxes upon employment and the standard of living. This means that it will be important for each and every citizen to give attention to these matters—because the policies of the government reflect, in the main, the thinking of the citizens.

Some taxes seriously discourage individuals and business firms from undertaking new and enlarged operations. Other taxes have little or no adverse effect on investments. Some taxes are a burden on consumption, affecting the sales of specific commodities, depending on the nature of the taxes. It is obvious that different kinds of taxes have different economic influences. *We must understand the forces that determine the level of employment and consider the tax program in relation to other measures designed to create more jobs.*

What are the tests of a good tax system?

1. **Taxes should be designed to encourage production and enterprise and to make it attractive for a large number of people to earn all or part of their living by giving jobs to others.**

2. **Taxation must be fair in principle and administration, with no discrimination between persons in similar circumstances.**

3. **Taxes should be apparent and not concealed, and should be levied, in the main, directly upon individuals so that each of us will know how much our government is costing him. A moderate income tax at the lower income levels will bring a greater awareness of responsibility than will heavy taxes on consumption which the taxpayer does not see because they are hidden in the prices he pays.**

4. **In the aggregate, taxes should be somewhat progressive.**

5. **The tax system should be coordinated with the broader objectives of monetary and fiscal policy.**

6. **Federal, state, and local tax policies should be integrated as to principles and objectives.**

Judged by these standards, our present tax system is extremely unsatisfactory; in fact, it is actually damaging. It is a conglomeration of hidden and direct taxes and of conflicting taxing jurisdictions and policies, with no comprehensive economic motive. It is distorted to appease pressure groups and includes uneconomic punitive measures. It is full of needless complexities. It is a paradise for tax lawyers and a source of confusion and despair for the honest, enterprising business man. In fact, it would seem almost as if our tax laws had been written by some fifth columnist for the purpose of making private enterprise unworkable. We in America pretend to believe in the pioneer spirit, but no one would ever suspect it by looking at our tax system.

When the war is over, there must be a thorough reform of our entire tax system. Federal taxes can and should be reduced substantially; and, in the process of reduction, changes can more readily be introduced. At that time, steps can be taken to achieve some degree of coordination and unity of purpose among federal, state, and local taxing agencies. Taxes play too important a role in our total economic life to ignore the adverse consequences of unrelated and inconsistent policies of different taxing jurisdictions.

The following reform measures are needed in federal taxation:

1. **Repeal of the excess profits tax at the earliest possible date after inflationary dangers subside. In the case of most enterprises, the excess profits tax destroys all incentive to do a larger volume of business than in 1939; it appropriates virtually all increase in profits above the level of 1939.**

2. **Coordinate corporation and individual income taxes so as to avoid double taxation and impediments to risk-taking. Preferably, corporation income taxes should be wholly eliminated. Otherwise, the corporation tax rates should be reduced to the lowest effective rate on personal incomes. Full credit should be given to stockholders for all corporate income taxes paid.**

3. **Encourage competition and particularly the formation of new enterprises by allowing new corporations generous tax exemptions for a period of five years. Extend the same principle to unincorporated concerns.**

4. **Encourage risk-taking (and hence job-**

giving) through extending the loss carry-over to six years or more.

5. Provide for averaging incomes over a period of years in order to remove discrimination against those with irregular incomes and those who take risks of loss in business ventures.

6. Rely upon the personal income tax as the main source of revenue, with broad coverage. The reduction in total taxes after the war should favor the elimination of excise taxes before reducing income taxes.

7. Reduce the upper range of personal income tax rates to a maximum of perhaps fifty to sixty per cent so that risk-taking investments will be really attractive. Higher rates are punitive in character, yield small receipts, and throttle risk-taking.

8. Encourage risk-taking by individuals in the higher brackets by making the surtax on incomes of $20,000 a year or more half as much on income in the form of dividends as on income in the form of salaries or interest.

9. Encourage risk-taking by individuals by permitting capital losses to be charged against general income provided the reduction of tax liability in any one year is not more than fifty per cent.

10. Repeal the tax-exempt privilege for all *new* securities issued by all governmental jurisdictions.

11. Eliminate excise taxes which place a disproportionate burden on persons with lower incomes so as to encourage greater consumption and provide an expanded market for our vast industrial capacity.

12. Reform tax administration to simplify forms and procedures, to broaden the scope of enforcement, and to encourage the spirit of fairness.

With such reforms and continuing reappraisal of the tax program as it affects the economic situation, we can look toward taxation as an instrument of constructive influence in giving the fullest encouragement to free enterprise and in attaining continued prosperity.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

To Heat-Treat In or Out?

BY A. S. EVES, CHIEF FIELD ENGINEER, PERFECTION TOOL & METAL TREATING COMPANY

Can you afford to do a first-class heat-treating job in your plant, or should the work be sent to an expert commercial shop? Fill out these forms and check the costs against outside quotations

COME WITH ME for a visit to a thriving industrial community in which we find four metal-working plants all rather much alike—except for one thing. They each have a different idea about heat-treating:

No. 1 does all its own hardening—perhaps occasionally accommodates a neighbor.

No. 2 heat-treats all of its production parts, but sends out its tools because of the greater responsibility.

No. 3 hardens all tools, but sends out production work because of volume.

No. 4 has no heat-treating department and, therefore, sends everything out.

Other things being equal, my contention is that one of these four concerns is dead wrong. Yet speaking broadly, this is a situation to be encountered all over the country.

Right at the start, let me spike once and for all the idea that any intelligent heat-treating firm is jealous when a manufacturer can do any such work at home, both economically and properly. What the professional heat-treater does object to, and rightfully so, is the economic waste which results from jobs hardened at home, but which the outside firm can do cheaper, faster or better—or all three.

Probably not one of the four firms mentioned above could logically explain why its heat-treating department is handled in the manner cited. If one will take pains to gather a few figures and be honest with himself, it is possible to come close to determining whether any job should be heat-treated at home or not.

The two simple forms given herewith will aid in this analysis. One lists the investment items, and the other shows the expense items. Merely fill them out and divide the total by the pieces or pounds to be treated. Obtain quotations for comparison. Perhaps some items have been omitted from these forms, and any worthwhile additions by readers will be welcome.

Note particularly that there is no space provided on either form for the degree of skill required. Yet skill is

HEAT TREATING INVESTMENT

Furnaces:
- For high-speed steel ..... $——
- For other steels (stationary) ..... ——
- For other steels (rotary) ..... ——
- For drawing (electric-oil-gas) ..... ——
- For miscellaneous work—cyaniding, aerocasing, nitriding, Chapmanizing, normalizing, annealing, preheating, selective hardening (lead pot jobs) ..... ——

Installation, wiring, piping

Accessories:
- Pyrometers ..... ——
- Thermocouples ..... ——
- Thermometers ..... ——
- Controls ..... ——
- Gas pressure regulators ..... ——
- Cooling systems for tanks ..... ——

Tanks:
- Oil storage (underground) ..... ——
- Oil quenching ..... ——
- Water quenching ..... ——
- Brine quenching ..... ——
- Cleaning ..... ——

Sand blast equipment:
- Masks and gloves ..... ——
- Nozzles ..... ——

Degreasing equipment:
- Cleaning kettles ..... ——
- Tumbler ..... ——

Motors ..... ——
Fans ..... ——
Pumps ..... ——
Screens ..... ——
Metal Baskets ..... ——
Alloy steel pots ..... ——
Ventilating apparatus ..... ——
Grinder ..... ——
Anvil ..... ——
Benches ..... ——
Files, and small tools ..... ——

Straightening presses:
- Straightness indicator ..... ——
- Hardness testing machine ..... ——

Special trucks for hot material ..... ——
Cranes, hoists, overhead equipment ..... ——
Installation of all the above ..... ——
Total Investment ..... $——

vitally important, since it may affect the amount of spoilage or determine the length of time a production part will last. In the case of tools it certainly will have a direct bearing on the amount of production and tool life.

If the man who signs the checks insists upon analysis of a few hardening jobs as suggested, he will find plenty of opportunity to save money —and probably make a distinct contribution to the war effort by saving man-hours and scarce materials.

Let me make it plain that this thinking does not apply solely to quantity production. In thousands of shops right at this moment one can find a high-priced toolmaker hardening a small die or punch. He may have sufficient good equipment or he may possess only a coal stove and a tin bucket with some sort of hot-plate for tempering. In either case, the habit of doing such jobs wastes hours of time and a lot of fuel, ince a commercial hardening plant would do the same job, as well if not better, for a few pennies. If the toolmaker happens to lack either heat-treating skill or adequate equipment, the result usually is an inferior job or worse. Lack of skill is one reason why less than 25 percent of the tools made in the toolrooms of this country finally reach the job and there perform at maximum efficiency.

If a job is one that should be sent out, the first thing to do is find a modern well equipped professional plant with men who have years of experience and the greatest possible skill. Let us stop and think what such a plant has to offer. We can then understand why other firms use it—to the extent that it has graduated out of the village blacksmith class, and has become a specialized industry representing an investment of millions of dollars.

Here are some of the reasons:

1. The furnaces in a modern heat-treating plant usually run 24 hours a day, sometimes seven days a week. The volume of fuel used is great and consequently the lowest rate is paid per therm or kilowatt. As a rule that figure will be about a third the rate paid by a manufacturing establishment. Bear in mind, too, that the time and fuel required for warm-up are eliminated.

2. Besides a furnace for hardening each job, other furnaces are always available, at different heats, for preheating time, and temperature.

3. These furnaces are equipped wherever necessary with pyrometers, also automatic controls for atmosphere, heating time, and temperature.

4. Such commercial plants also have a multiplicity of kindred equipment that other manufacturers do not possess—for testing, straightening and blasting.

5. There are literally thousands of different steels on the market, and hundreds of different treatments. The commercial heat-treater deals with both day after day. He is held responsible to a large extent for the way tools and parts perform on the job. Thus, he comes to know which steels and which treatments are best.

6. Over a period of years, many heat-treaters have devised better treatments for certain work. Whether they keep such processes secret or not, they at least are available to the firms served.

7. It is well to remember that in order to grow and prosper, the commercial heat-treater simply must, at all times, keep ahead of the manufacturer. Otherwise, he would quickly find himself depending solely upon overflow work, or jobs for which firms have no equipment.

Far too many manufacturers buy heat-treating service with about the same degree of interest as when filling a requisition from the janitor for sweeping compound. That attitude is entirely wrong. Instead one should find a well-equipped professional plant suited to his requirements (and, by the way, no two in the country are alike). Preferably the shop chosen should be one with such a good reputation that the steel suppliers recommend it. Then mentally attach that plant to your own back door. Use it as an integral part of your own organization, reporting direct to someone who is really interested in results. Keep in touch with the new things it finds or develops. I promise you that at the end of a single year you will say "Well, I certainly got more out of that association than I had to pay in cash."

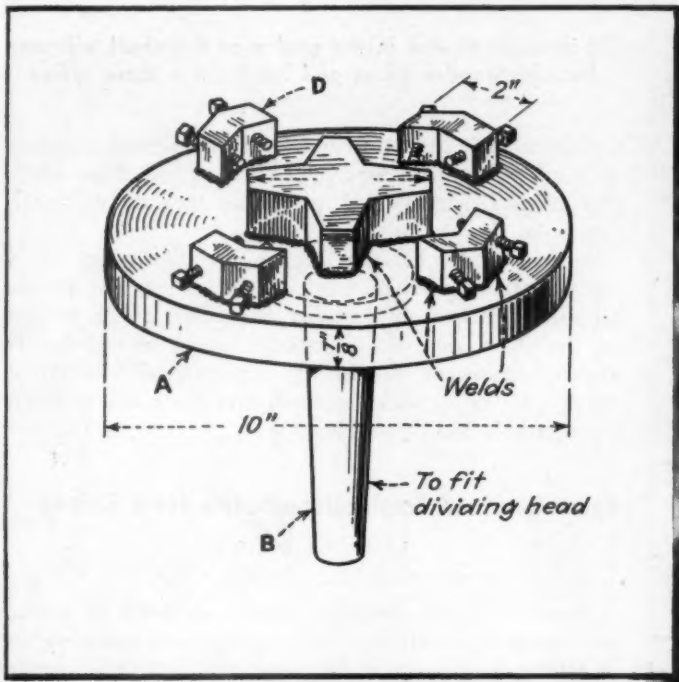
OPERATING EXPENSE

Interest on investment	$———	**Chemicals:**	
Rental value of space	———	Cyanide	———
Depreciation	———	Carburizing compound	———
Increased insurance	———	Charcoal	———
Light	———	Silica sand	———
Water	———	Steel shot or grit	———
Fuel:		Sawdust	———
Oil	———	Sodium chloride	———
Gas	———	Sodium nitrate	———
Electricity	———	Potassium nitrate	———
Relining and repairs	———	Cleaning compound	———
Replacement of:		Quenching oil	———
Containers	———	Drawing oil	———
Retorts	———	Drawing salts	———
Thermocouples	———	Lead	———
Pots	———	Emery cloth	———
Other	———	Other items	———
Outside inspection of:		**Estimate of work spoiled**	———
Pyrometers	———	**Labor——Man-hours of——per hr.**	———
Testing equipment	———	**Total Operating Cost**	$———

Practical Ideas

FROM PRACTICAL MEN

★ **War-Winning Suggestions appearing on these pages were selected from those recognized as meritorious by the Board of Individual Awards, War Production Drive. They are freely offered to industry as an aid to war production** ★



Castellated nuts are cut efficiently from standard hexagonal nuts, using an adaptor and a dividing head

Dividing Head Speeds Machining of Castle Nuts

BY C. A. KOTHE

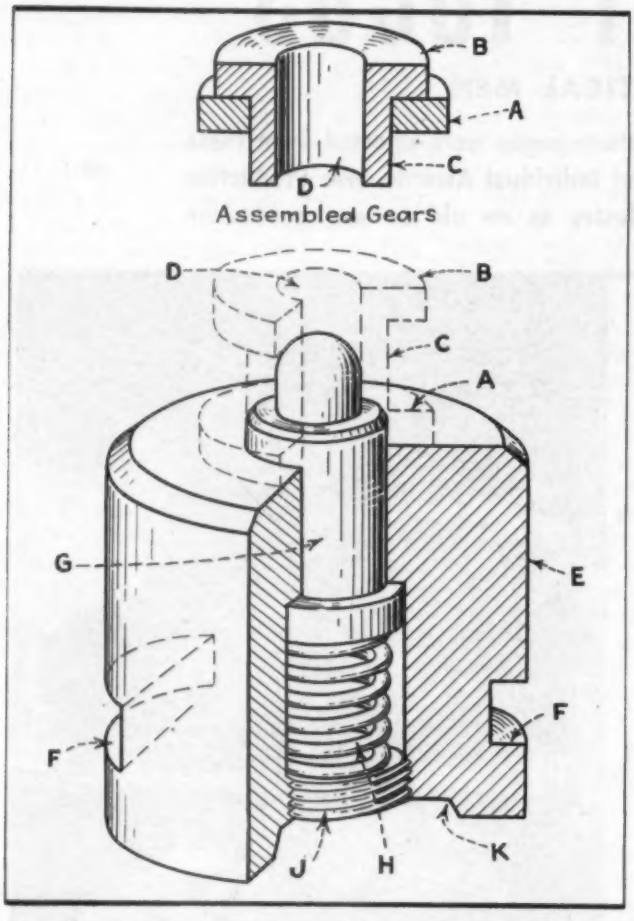
As a result of the war, certain materials used in making locomotive repairs are no longer obtainable on the market. One such item is castellated nuts, which now must be made by cutting slots in standard hexagonal nuts. This is done on a production basis by the Erie Railroad in its Meadville, Pa., shops, furnishing the nuts to the main storehouse, which in turn ships them to all other shops and enginehouses on this railroad. The slots in the hexagonal nuts are milled, using the illustrated fixture.

This fixture is made of plate *A* to which is welded taper shank *B* for mounting in dividing head *C*. Steel blocks *D*, each with two setscrews, are welded to plate *A* so as to hold four nuts equally spaced. Two cutters of the same dimensions and correctly spaced are mounted on the arbor of the milling machine. At the beginning of a run, four nuts are clamped in plate *A* and the dividing head is rotated until two nuts are in position for milling. After the cut on the first pair of nuts is completed, the dividing head is indexed 90 deg. for milling the first slot in each of the other two nuts. While the latter is being done, the two nuts milled previously are repositioned in the fixture and made ready for the next cut. This procedure is repeated after each cut, and as finished nuts are removed from the fixture, new hexagonal nuts are applied. Since two nuts are slotted at each pass of the cutters, during which time the other two nuts are setup for the next cut, work progresses steadily, utilizing maximum machine time.

Assembly Fixture Holds Gears in Alignment

BY ALEX GEORGE

During assembly of gears *A* and *B* shown in the drawing, an assembly fixture was needed to assure correct alignment of gear *A* on shoulder *C* of gear *B*. The assembly problem was made more difficult by the fact that the shoulder on gear *B* had to be machined 0.0005 in. larger than bore *D* in gear *A* in order to assure a positive fit of the two gears. The fixture designed for this assembly is



Two gears are mounted on the movable guide pin of this fixture and are held in alignment during assembly

shown in the drawing. It not only keeps the gears in alignment during assembly, but also prevents damage to the gear teeth during the operation.

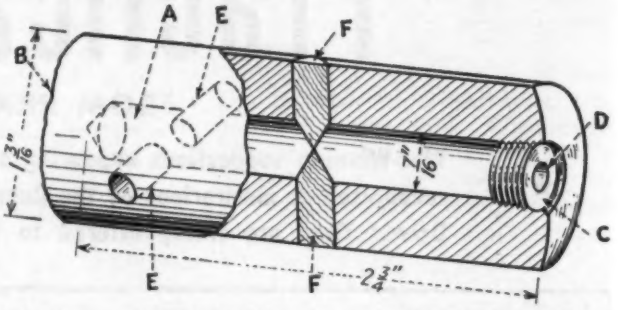
Body *E* is a piece of circular tool steel with two slots *F* milled across the circumference to permit clamping it to the arbor press. It is bored for sliding fit of guide *G*. This guide is hardened and ground to take bore *D* of gear *B*, and also to fit the bore in gear *A*. Spring *H* is inserted into the bore of body *E*, and is backed up and adjusted by screw *J*. Relief *K* is used to assure a locating surface for the fixture on the press table.

The fixture is mounted on the table on an arbor press and gear *A* is placed on the larger diameter of guide *G*, after which gear *B* is mounted over the smaller diameter of the guide. The ram of the press is then brought down to contact gear *B*. When pressure is applied, spring *H* is compressed as shoulder *C* on gear *B* enters gear *A*.

Continuous Lubrication for Loose Pulleys

BY MARTIN H. BALL

Dripping of lubricating oil from loose pulleys can be eliminated by the method described here. Hole *A* is first drilled in trunnion shaft *B*, and is then tapped for pipe plug *C*. A ⅛ in. hole *D* is drilled through this plug. Finally, four ¼ in. holes *E* are drilled through shaft *B*



Oil in a candlewick in the center of this shaft will seep through wooden plugs and lubricate a loose pulley

as shown. Hole *A* is then filled with candlewick saturated with oil, after which pipe plug *C* is applied. Four white-pine plugs *F* with 90-deg. points are then driven tightly into holes *E*.

Sufficient oil will seep through the pine plugs to the surface of the shaft to lubricate the pulley, and yet the oil will not drip from the shaft. Regardless of the position of the shaft, one of the wooden plugs will always be sloping downward, facilitating seepage of oil through it. When the candlewick becomes dry, more oil is added through hole *D* in pipe plug *C*.

Burrs Removed Semi-Automatically from Screws

BY CLYDE BRINSER
International Business Machines Corporation

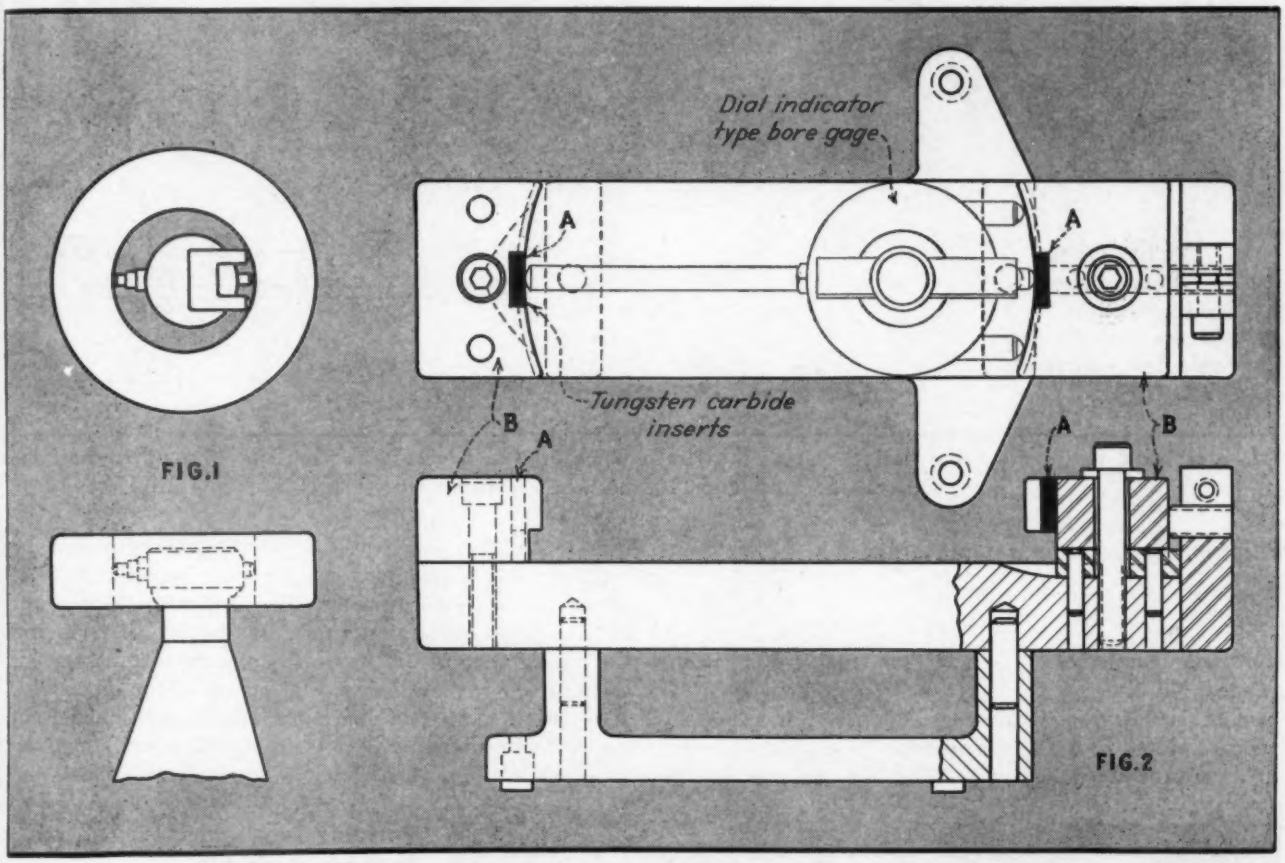
Burrs are usually removed from screw heads by placing each screw separately in a lathe, burring, and removing one at a time. In our shops, four operators using this method and working ten hours a day finished approximately 8,000 pieces. The illustrated device is eight to ten times faster.

It is comprised of a wheel drilled radially at the periphery

Screws are placed in the periphery of this wheel and fed against a wire brush for removing burrs. The screws fall from the wheel by gravity

for insertion of the screws. The wheel is rotated on a shaft so placed that the screw heads hit a wire brush mounted on the spindle of an electric motor. Two wheels have been made for this job, permitting the use of four different standard size screws. The wheel makes one revolution every two minutes, during which time 75 screws are burred. The holes in the wheel are loose enough to allow a screw to revolve or turn around as it comes into contact with the wire brush. This completely smooths the screw heads, making retouching unnecessary. The screws fall by gravity into a receptacle after passing the brush; therefore, the operator only has to keep loading the wheel.

It is now planned to use this device for polishing operations on the screw heads. It does a reliable job and production for one operator has jumped from 8,000 to 22,000 screws burred during one ten-hour shift. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



This design of Swedish bore gage in large sizes can be used instead of solid ring gages. It saves steel, facilitates handling and storage, and permits use of cemented-carbide inserts at low cost

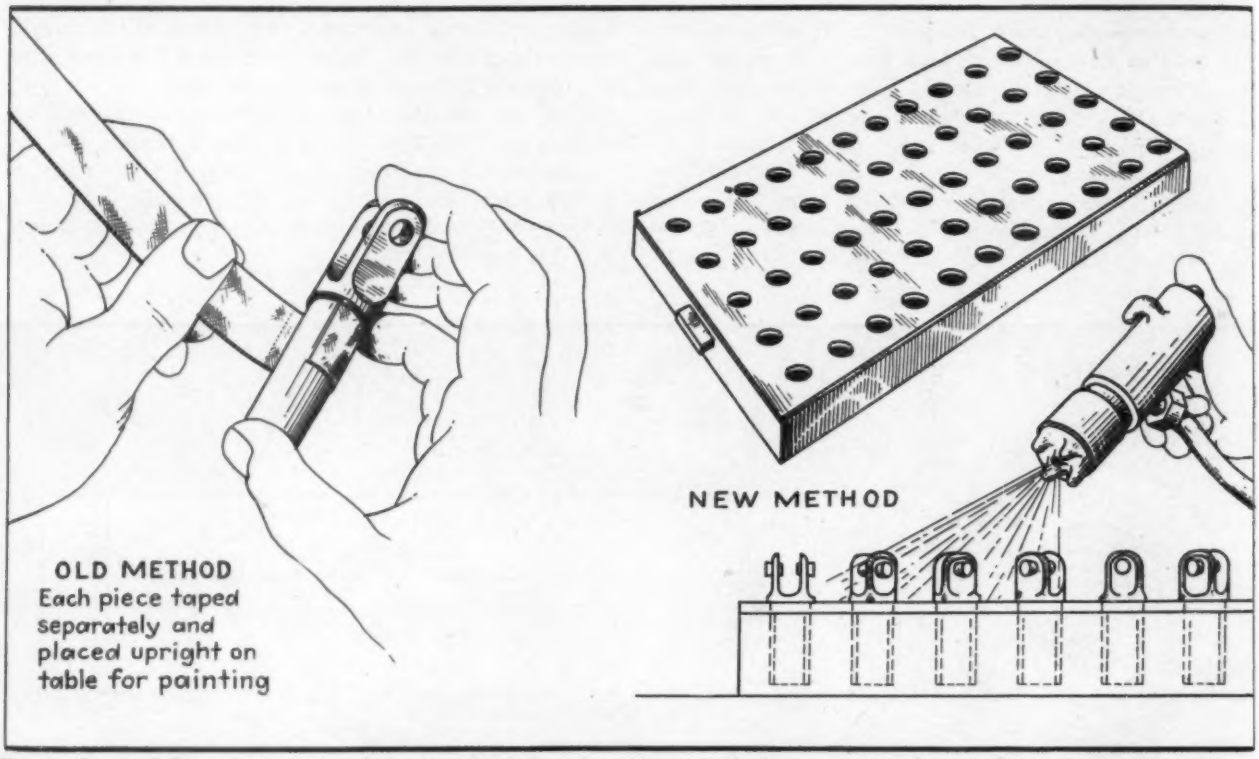
Redesigned Gage Blocks Save Steel

BY JOSEPH KAUTSKY
Link-Belt Company

The master ring gage shown in Fig. 1 is used generally to set Swedish bore gages. It has always been satisfactory because the operator in setting the gage has about the same sense of feel as he would have in placing the gage in the bore of work being ground. The master ring gages in the larger bore sizes, however, require a considerable amount of high-grade steel because they must be heavy enough to retain their shape. Furthermore, they are heavy to handle and less convenient to stock and arrange for use by machine operators when these men are checking finished work.

In order to save steel, make such master gages easier to handle, and minimize wear, the design shown in Fig. 2 has been adopted. Inserts *A* of tungsten-carbide are ground to exact bore curvature and fitted in blocks *B* that can be adjusted for regrinding to a true bore after some wear has occurred. As with the master ring gage, the operator has the same sense of feel as he has in setting the Swedish bore gage in the part being measured. This particular design in large master gage sizes permits the use of small amounts of tungsten carbide to minimize wear and increase service life. On the other hand, tungsten-carbide inserts in large solid ring gages are expensive and generally not used, necessitating replating and grinding of solid steel when they wear to established limits.

Aside from increasing service life, this design of master block has considerably reduced manufacturing costs as compared to the cost of similar sizes of solid ring gages. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



This rack, used for painting the slotted end of shackles, eliminated the necessity for masking the parts, and increased production 300 percent per man-hour

Painting Rack Eliminates Masking

BY ZENO IVERY
Murray Corporation of America

A rack that serves not only to hold parts while being painted, but also acts as a mask to cover portion not to be painted, is shown in the drawing. Formerly, three persons were employed to mask and unmask these parts in order to meet production schedules. One man can now handle the same number of parts that were formerly masked by three persons while preparing the parts for painting. Removal of the parts from the rack after painting requires but a fraction of the time previously needed for removing the masks. Aside from time and masking material saved, two people have been released for production on other jobs. It is estimated that this rack has effected an annual saving of 546 man-hours. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

This boring bar operated by an air motor is used to face and bore link trunnion bushings without removing the trunnion brackets from the locomotive. Facing and boring operations are completed in two set-ups.

Portable Tool Speeds Locomotive Repairs

BY L. W. SAGLE

The Baltimore & Ohio Railroad has devised a method for boring and facing valve-gear link trunnion brackets without removing them from the locomotive when making heavy repairs. A portable air motor drives boring bar *A* mounted on cross-slide *B* fitted to ways *C*. The latter are bolted to bracket *D*, consisting of two end members that straddle the top rail of the frame. Three setscrews in each leg secure bracket *D* to the frame, and afford sufficient support to hold the boring bar in alignment during machining operations.

The outboard end of the boring bar rotates in a bronze bushing fitted in bracket *E*. The latter is secured to the

trunnion yoke by four setscrews and washer *F*. Toolholder *G* is keyed to the boring bar. Cuts are made by setting the tool against the surface to be machined and traversing the boring bar by hand feedscrew *H*. Faces of each trunnion bushing can be machined accurately, and the bushings bored in line in two operations.

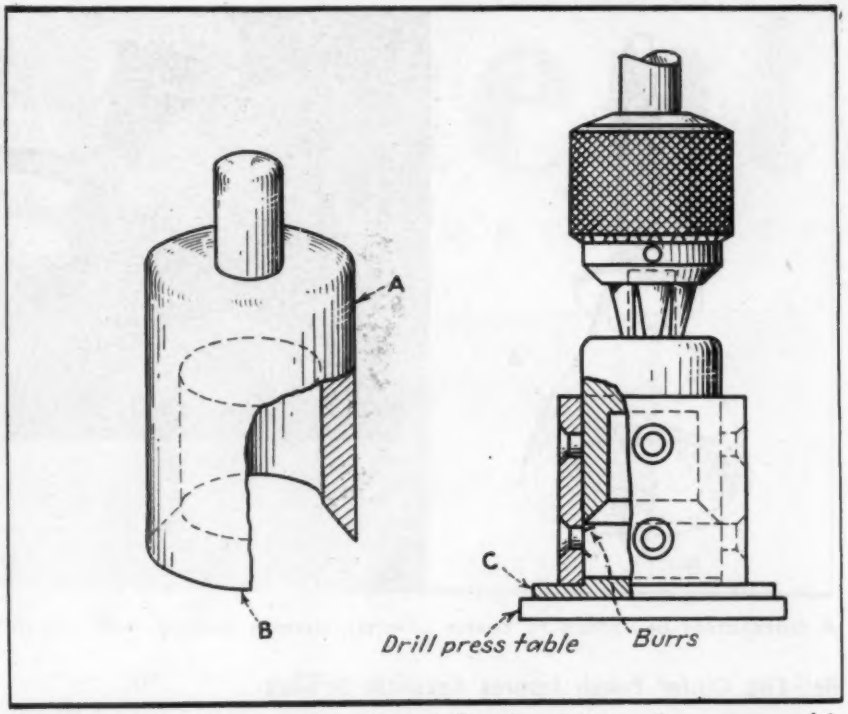
Circular Tool Removes Burrs From Cylinders

BY EARL J. BREEDING

Removing burrs from the bore of small cylinders that have been drilled radially is a tedious operation if done with a hand scraper. A simple tool that eliminates this work is shown in the drawing.

Circular tool *A* is ground 0.0015 to 0.002 in smaller than the bore of the cylinder to be burred, and a cutting edge is ground on lower end *B* of the tool. The cylinder to be burred is placed on rabbet plate *C*, locating on the cylinder bore. Plate *C* in turn is clamped on the table of a drill press or arbor press, and its rabbet aligned with the press spindle by an indicator. The burring is done by lowering tool *A* by hand into the cylinder, one pass being sufficient to remove the burrs.

Care must be taken to align tool *A* properly with the bore of the cylinder, and the tolerance on the diameter of tool *A* must correspond with play in the spindle if the work is to be on the drill press. If a drill press is not available, a lever fixture can be made to carry the tool.



This circular tool is mounted in the spindle of a drill or arbor press, and is pushed through a cylinder by hand to remove burrs on radially drilled holes

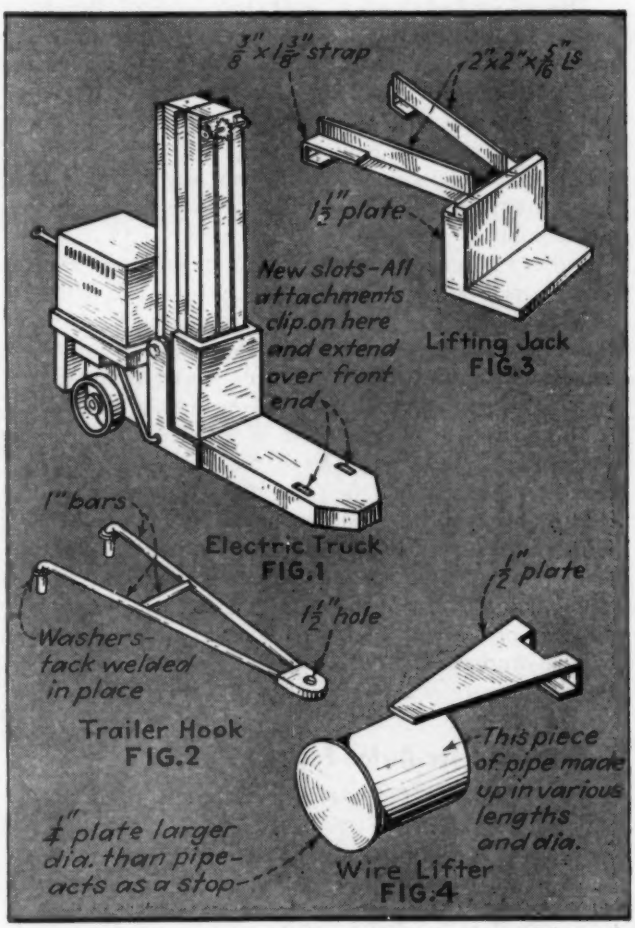
Truck Attachments Simplify Materials Handling

BY DANIEL IPPOLITTO
Star Electric Motor Company

The attachments shown in the drawing are adaptable to lift trucks for carrying motors, coils of wire, steel stock, and general delivery of freight in and around shops. Fig. 1 shows a truck and indicates the only change necessary to apply the attachments—the addition of two slots 3 in. wide and 6 in. long.

The trailer hook shown in Fig. 2 is used to connect a three-wheel trailer to the electric truck, loading and unloading of the trailer being done while the truck is busy elsewhere. A lifting jack is shown in Fig. 3. This device is slipped under a machine or similar object, which may be moved after raising the hoist a minimum amount.

A lifter for handling reels of wire is shown in Fig. 4. Before using this attachment, it took three men two days to unload a carload of wire. Now the complete job can be done in six hours, including the stacking in the storeroom. The hoist raises the attachment to the level of the reel, and after it is inserted in the hub of the reel, the wire is carted to storage. *War Winning Suggestions from the Board for Individual Awards, War Production Drive.*


3/8" x 1 3/8" strap
2"x2"x5/16" L's
1/2" plate
New slots-All attachments clip on here and extend over front end
Lifting Jack FIG.3
1" bars
Electric Truck FIG.1
1/2" plate
1 1/2" hole
Washers-tack welded in place
Trailer Hook FIG.2
This piece of pipe made up in various lengths and dia.
1/4" plate larger dia. than pipe-acts as a stop
Wire Lifter FIG.4

These attachments applied in slots cut in a lift-truck platform increase the usefulness of the truck

A transparent bell fitted to center punches, permits holding tools accurately at 90 deg. to the work surface

Bell-Cap Center Punch Insures Accurate Drilling

BY JOSEPH PHILLIPS
Curtiss-Wright Corporation

The illustrated tool is used for locating the exact center of a hole to be center punched, and provides a means for starting a drill point at exactly 90 deg. to the work. It consists of a transparent Plexiglass bell cap *A*, with a center punch *B* extending through the apex. Spring *C* holds the punch in an extended outward position as shown in the drawing. The bell cap may be made from metal or any suitable material with cutaway sections to permit visibility.

Bell cap *A* rests flat on the surface of the work, and the center punch can be located accurately since it is visible at all times. Without this tool, the center punch often deviates from the vertical, and since the drill will follow the tangent established by the center punch, reworking or scraping of parts may result because of misaligned holes.

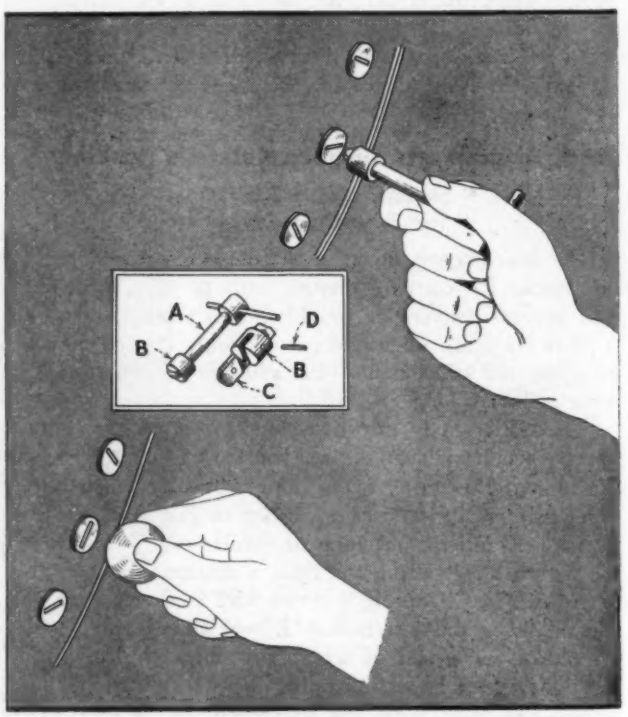
This tool is used extensively in templet work, because the transfer of form pinholes in the coordination of templets is important. The bell cap has also been applied to electric hand drills, and pneumatic hand riveters and squeezers. In these applications, the Plexiglass bell is resiliently mounted for longitudinal movement only on the frame of the tool, and the operating tool extends through the apex of the bell. Spring tension is preferably adjusted by the workman. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

Tool Devised for Airloc Fasteners

BY GILMORE PEERS
Northrop Aircraft, Inc.

A cowl fastener wrench adaptable to Dzus and Airloc fasteners has been devised to replace the metal disk usually employed to tighten such screws. The handling of this metal disk is tedious, since it is not equipped with proper leverage.

The new tool, shown in the drawing, consists of T-handle *A* and locking bar *B* for removable wrench bit *C*. One end of bar *B* is cut flat and grooved to take bit *C*. The bit is secured by pin *D*, and carries sufficient radius on one edge to fit the recess in the fasteners. This tool supplies the mechanic with plenty of leverage, and the milled surface which backs up the bit insures a better grip in the slots in the fastener heads. *War Winning Suggestions from the Board for Individual Awards, War Production Drive.*



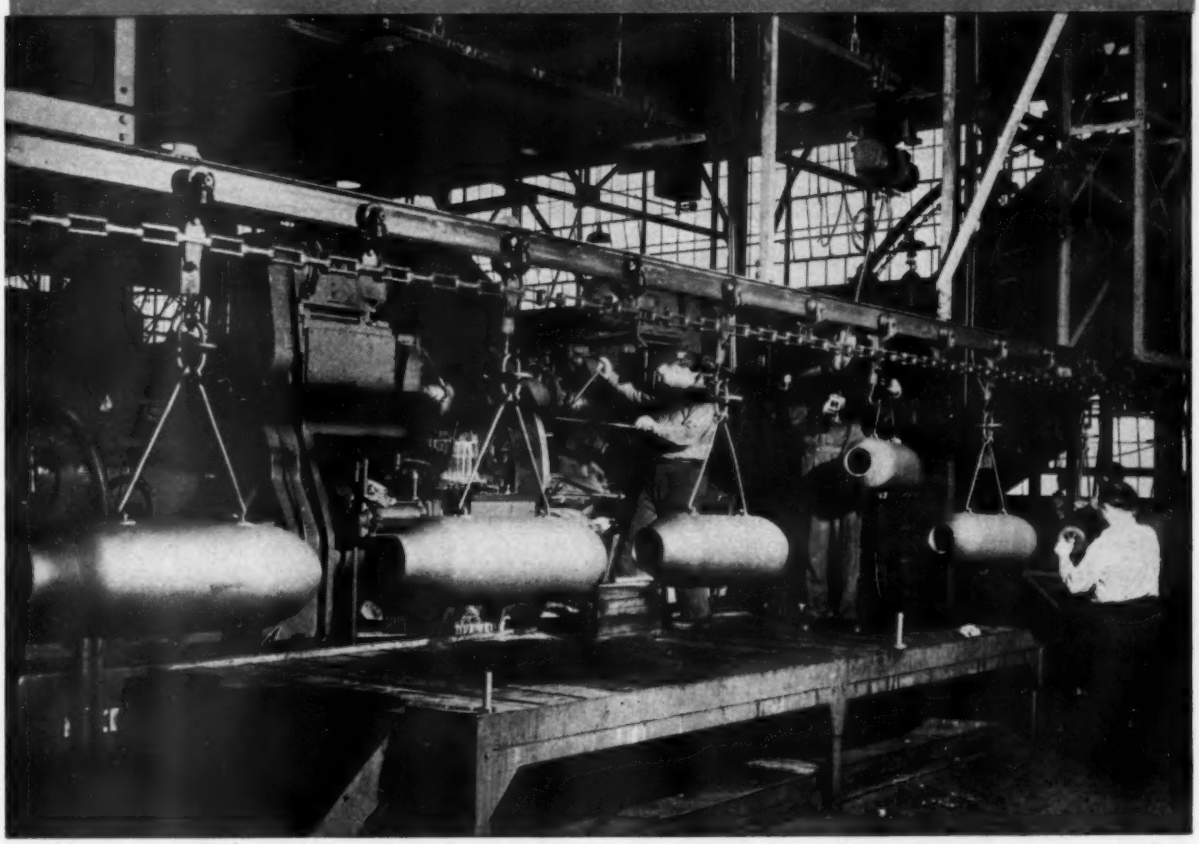
This tool is more convenient than a metal disk to use when tightening Airloc and Dzus fasteners. Its use eliminates damage to the fastener heads

Armament

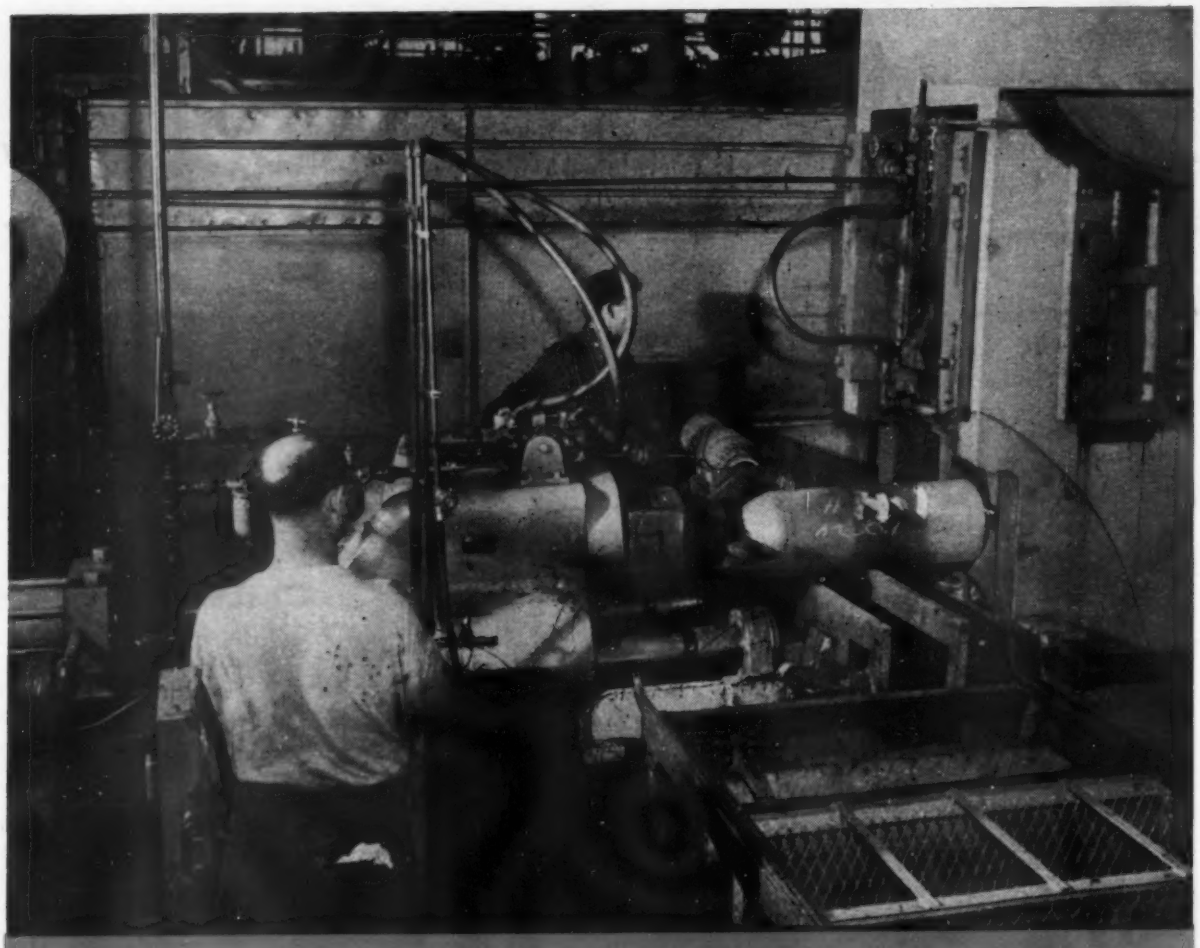
SECTION OF AMERICAN MACHINIST

Bomb Manufacture Speeded By Mechanical Handling Methods

BY W. V. CASGRAIN AND L. J. BISHOP
Mechanical Handling Systems, Incorporated



Both the nose and tail ends of each bomb are bored, faced and tapped in one of these five-station machines. The same conveyor delivers rough bodies and takes away finish-machined bombs. At the right is shown an inspector checking a machined bomb



At each tail forging press, the work carrier has jaws which grip the bomb around the nose end. In the background can be seen a helper moving a finish-forged bomb onto the enclosed cooling conveyor

IN PLANNING THE LAYOUT for a new plant of Mechanical Handling Systems, Incorporated, for the manufacture of general-purpose 250-lb. demolition bombs, manufacturing equipment and work handling facilities were selected to permit employment of the highest possible percentage of women production workers. Even in the case of operations for which men must be employed, everything possible has been done to eliminate fatigue. As a result, at no place in a bomb forging or machining line is it necessary for an operator to lift or carry a bomb body.

To achieve this, either a conveyor line, a conveniently located overhead hoist or, if necessary, some special mechanical handling unit is provided at each position where a bomb body must be moved. Our company engineers developed much of the special handling equipment employed. That this care in layout has been worth while is shown in the fact that these bombs are being turned out in considerable quantities, with a scrap loss of only 0.25 to 0.35 percent.

It is of interest that even in the detailed parts machining group, a conveyor is provided for directing and delivering parts to and from the machines. This conveyor delivers the finished parts from the detail machining group to inspection benches, placed along the final bomb assembly line, where the parts are required. All of the forging, heat-treating, cleaning and machining equipment has capacity for 500-lb. bombs, and it would be a simple matter to retool these units to make the larger bomb in case of contract changes.

Seamless bomb pipe is received at the plant in mill lengths. A 5-ton capacity overhead crane removes these pipe lengths from gondola cars either direct to skids at the friction saw, or to yard storage areas where they are stacked according to heat numbers. Before sawing, the tubes are checked against analysis specifications by a receiving department inspector. When the crane delivers pipe lengths to the friction saw skids, a saw loader supervises the placing of the pipe on the skids, and rolls it to the proper position

for delivery onto the friction saw feed table.

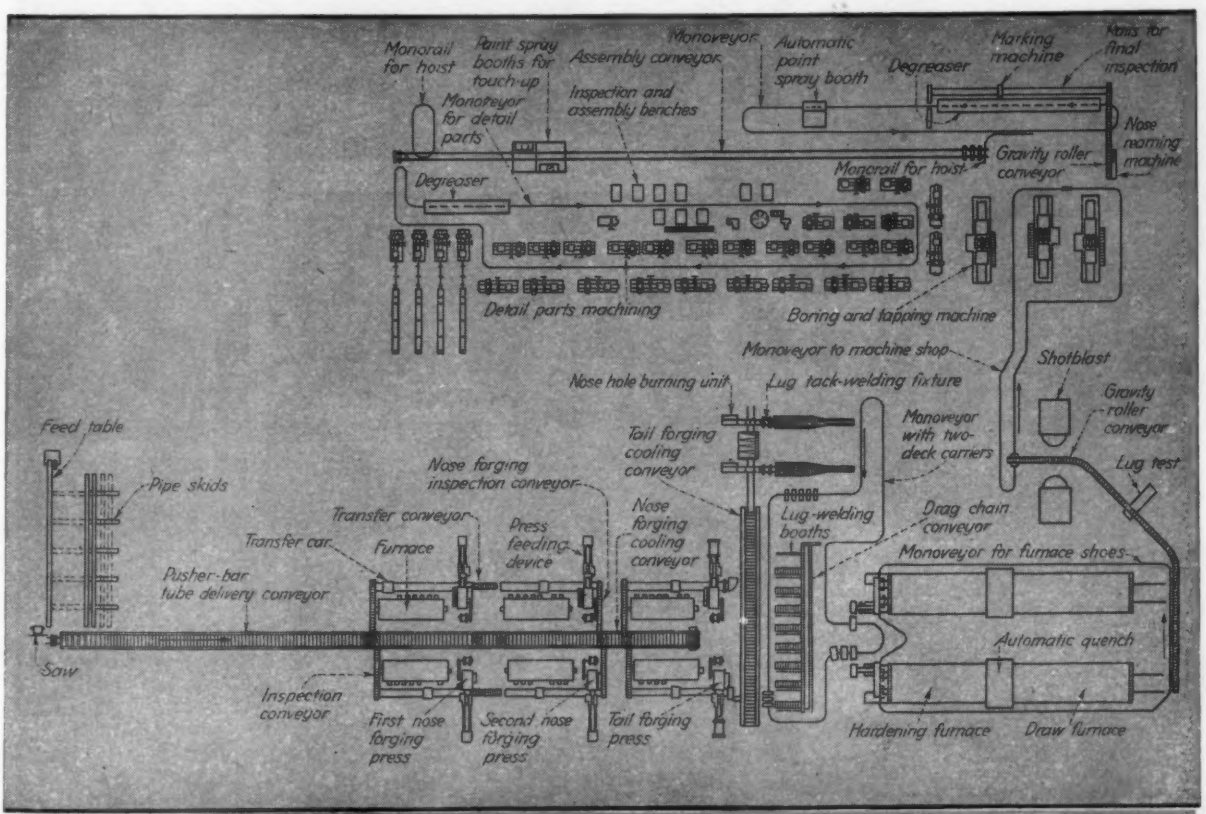
The foreman of the forging department advises the saw operator as to the length of tube to cut off to form a bomb, in order that sufficient stock will be available for forging the bomb to proper shape and size. Bomb tubes are cut off one at a time with a special Ryerson-Kling friction saw in which the 58-in. diameter serrated saw blade is direct-driven by a 125-hp., 1,800 r.p.m. motor. This saw has a 15-sc. sawing cycle when cutting this size of steel tubing, and requires approximately 8 sec. handling time for each cut. Experience has shown that a saw blade will average about 500 cuts for each hobbing of the serrated teeth. When cutting low carbon stock, we have made as many as 900 to 1,000 cuts between hobbings. The saw operator also sharpens the saw blades in a hobbing machine setup in the same department. From the saw the cut-off bomb sections are moved, on a short section of roller conveyor, to the loading station of a double strand chain pusher-type conveyor which delivers them to the nose heating furnace. While on the roller conveyor, each tube is held for a few seconds on two power driven rolls which rotate them between tilted roller cutters that remove the burrs raised by the friction sawing operation.

The conveyor delivering cut tubes to the heating furnaces has two unloading stations, one for each line of furnaces and forging presses. An inspector at each of these delivery stations checks the tubes and marks on it, with chalk, the daily bomb number and the heat number of the steel. The tube delivery conveyor is operated intermittingly by these inspectors, so that the tubes are dropped onto the inspection conveyors as needed. A pushbutton control station is located near each inspector's position. The conveyor moves forward one station each time a pushbutton is operated.

Delivered to Heating Furnaces

Bomb tubes automatically discharged from the delivery conveyor pass over a section of gravity roller conveyor past the inspector's station and are delivered at one end of a Hagen box-type, gas-fired furnace. Each of these tube heating furnaces has eight water-cooled openings into which the tubes are inserted one at a time by the furnace operator. This operator uses a transfer carriage having a roller-conveyor table, so that all he has to do is to pull a section of bomb tube on to the carriage, move the carriage in front of an open furnace position, and then push the tube into the furnace the correct distance.

Furnace temperature for the first nose forging is



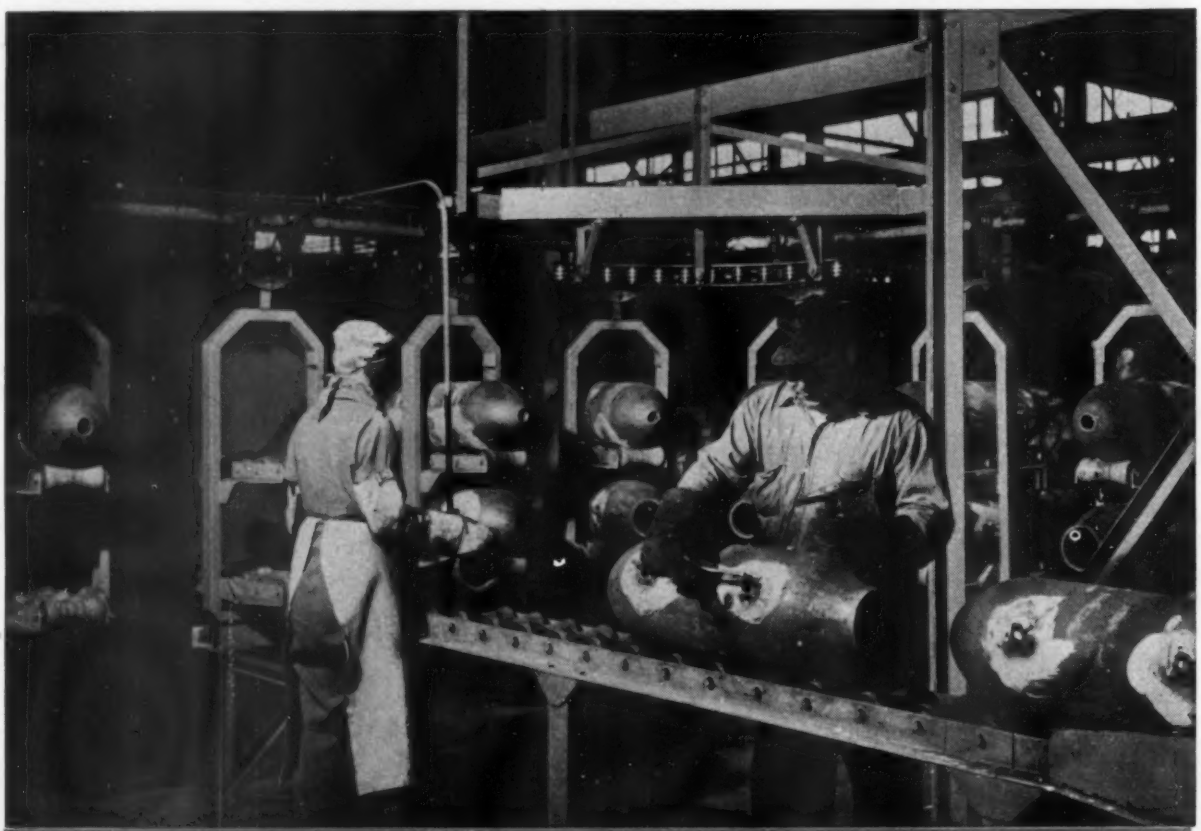
Mechanical handling devices, consisting of some type of conveyor or of overhead hoists, are provided throughout this bomb manufacturing department so that it is not necessary at any point for workmen to lift or carry a bomb body. Although set-up for 250-lb. bombs, the installed equipment can be retooled easily for 500-lb. bombs

controlled automatically to heat about 12 in. tube of length to 2,400 F. in 8 to 10 min. In order to insure that no tube is in the furnace for an excessive length of time, the furnace operator uses a predetermined sequence for placing and removing tubes from the furnace openings. With the furnace loaded, the operator removes a piece to the forging press, gets a new tube and inserts it in the same opening from which he has just removed a tube, and then moves to the next station and repeats the cycle.

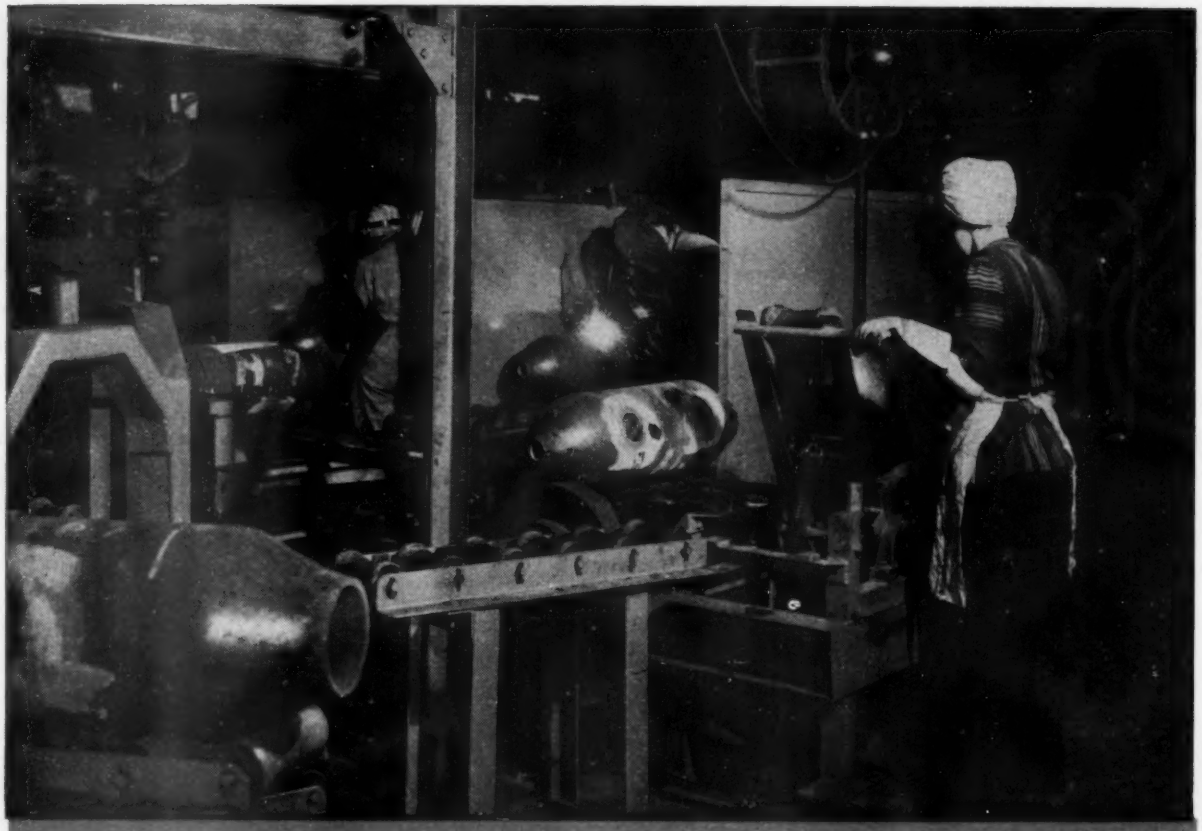
Forged in Three Operations

The 250-lb. bombs made in this plant are forged to shape in three operations. Each of these operations is preceded by heating the proper end of the tube in a furnace of the type just described. The nose end of each bomb is forged in two operations while the tail end, which requires considerably less working of metal, is forged in one operation. Each forging operation is done in a special Dries & Krump single-crank, 250-ton capacity forging press with 3-in. stroke. Each press is driven at 160 strokes per minute by a 40-hp. motor. To conserve time, the presses are kept operating continuously, even when tube lengths are being loaded and unloaded from the feeding devices, with which each press is equipped.

For the two forging operations on the nose-end, the bomb tube is supported at the cold end on a stub arbor extending from the feeding device. Three expanding jaws in each of these arbors grip the tube and rotate it while it is being forced into the forging dies. At each return stroke of the press, the tube is rotated approximately 50 deg. The special feeding devices are arranged so that the hydraulic cylinders move the tube holders toward the dies under constant pressure. Thus, as the nose is formed by the forging dies, the tube is constantly pushed forward and the nose end is in contact with the dies all of the time. The operator of the forging press moves the work-holder forward to a gage point, which indicates to him that the operation has been completed. While forging a bomb nose or tail section, the press operator sprays a stream of cold water into the dies to break up scale on the work and to help keep the dies cool. Upon completion of a forging cycle, the operator withdraws the feeding device which automatically retracts the clamp jaws and permits the tube to roll down rails away from the press.



When the three suspension lugs have been welded in position, an inspector cleans off the weld spatter and checks for accuracy of lug location. Then, a helper transfers the bomb bodies from the roller conveyor to the lower deck of a two-level carrier on a Monovoyor conveyor



Final lug welding operations are performed in individual booths, each of which is served by a roller conveyor onto which the bombs are rolled from the lower deck of the Monoveyor carriers. When welding operations have been completed a drag chain conveyor moves the bombs to a clean-out position where a hand-operated tilter raises the bombs to drop scrap and scale out of the tail end. From here, the bombs are loaded onto the upper position of the Monoveyor carriers

Approximately half of the work of forging the nose end is done in the first forging operation. At the second furnace, the nose end is heated to about 2,500 F., this higher temperature being used so that the metal will upset readily in closing the nose. Again, approximately 12 in. of tube length is heated. The forging set-up for the second nose forging operation is essentially the same as that for the first nose forging operation. In this operation, a hot die lubricant consisting of oil mixed with colloidal graphite is sprayed into the die opening, and the water spray also is used. After the second nose forging operation, an inspector uses a templet gage to check the nose shape. The bomb tubes then are moved along a roller conveyor to a double-strand chain pusher-type cooling conveyor which moves the bomb shape about 200 ft. before delivery to a Hagen tail heating furnace. While on this conveyor, the bombs cool sufficiently to permit handling.

For the tail forging operation about 12 in. of tube length is heated to 2,250 F. in 8 to 10 min. and then the tube is delivered to the tail forging press. Here, the feeding device has three jaws which grip the outside of the bomb tube around the finish-forged nose end. This device is fed forward to move the bomb tube into the dies until a gage indicates that the tail end has been finish-forged. Water is sprayed into the tail forging dies for cooling and scale removal, as before. Finish-forged bombs are delivered from the tail forging press on a chute which carries them to a section of roller conveyor. Here, this roller conveyor section is turned manually 90 deg. and the finished bomb pushed into a loading opening of a cooling conveyor. This is a double-strand chain pusher-bar type conveyor which is enclosed in a sheet metal housing. Bombs as delivered from this conveyor at an inspection station are cool enough for handling. The bombs go through the housing of the cooling conveyor four times.

The dies for the nose and tail forging operations are cast from FCC-66 steel furnished by Detroit Forging Casting Corporation. This steel has an approximate analysis as follows: carbon, 1.50; chrome, 12.00; manganese, 0.35; silicon, 0.55; molybdenum, 0.90; and cobalt, 3.00 percent. Originally, these dies were heat-treated before use, but were found to crack soon. Now they are used without heat-treating, and longer die life is experienced. Dies are dressed at the

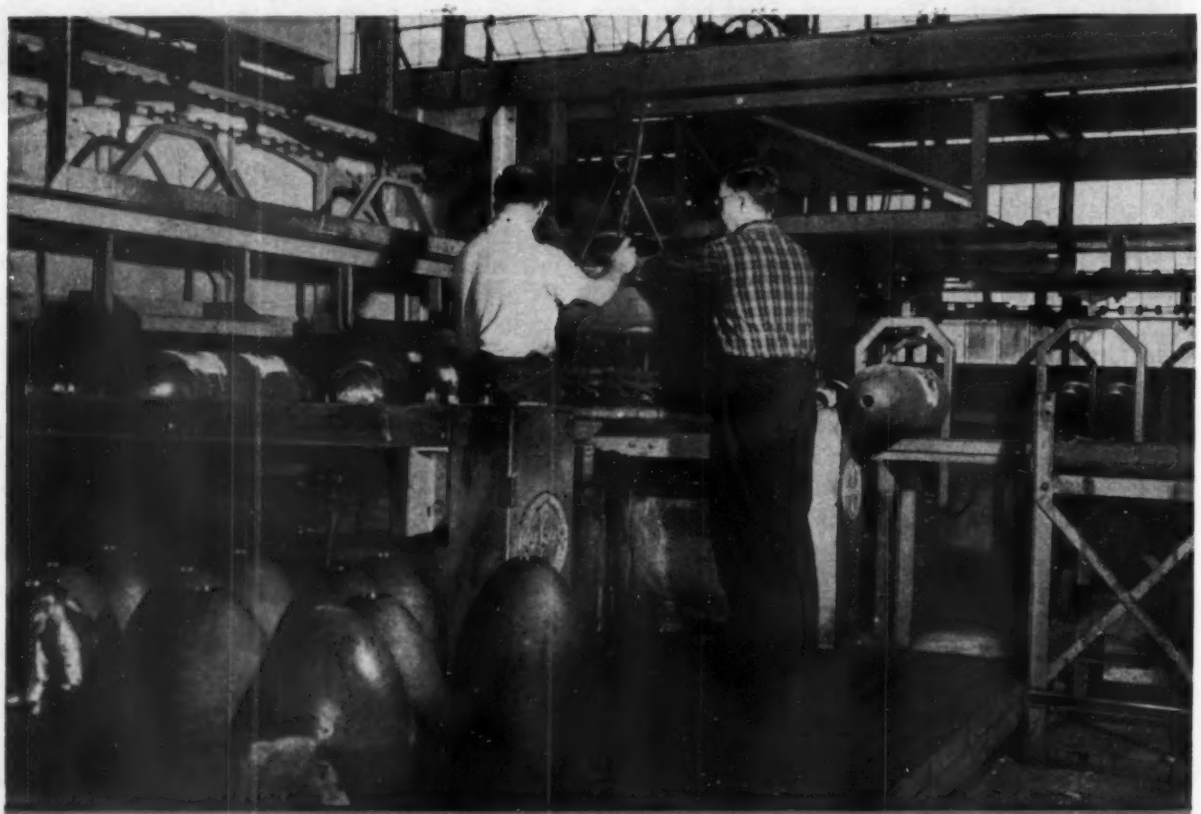
end of each shift with a hand grinder and hand sander. After forging about 20,000 bombs, each set of dies is rebored in a 44-in. American engine lathe equipped with a Turchan hydraulic duplicating attachment.

Bomb forgings delivered from the final cooling conveyor roll onto skids at an inspection station. Here inspectors use contour gages, over-all length gages and "go" and "not-go" tail bore gages to check the final forging dimensions. The inspectors roll approved forgings onto a section of roller conveyor which delivers them to the next operation group.

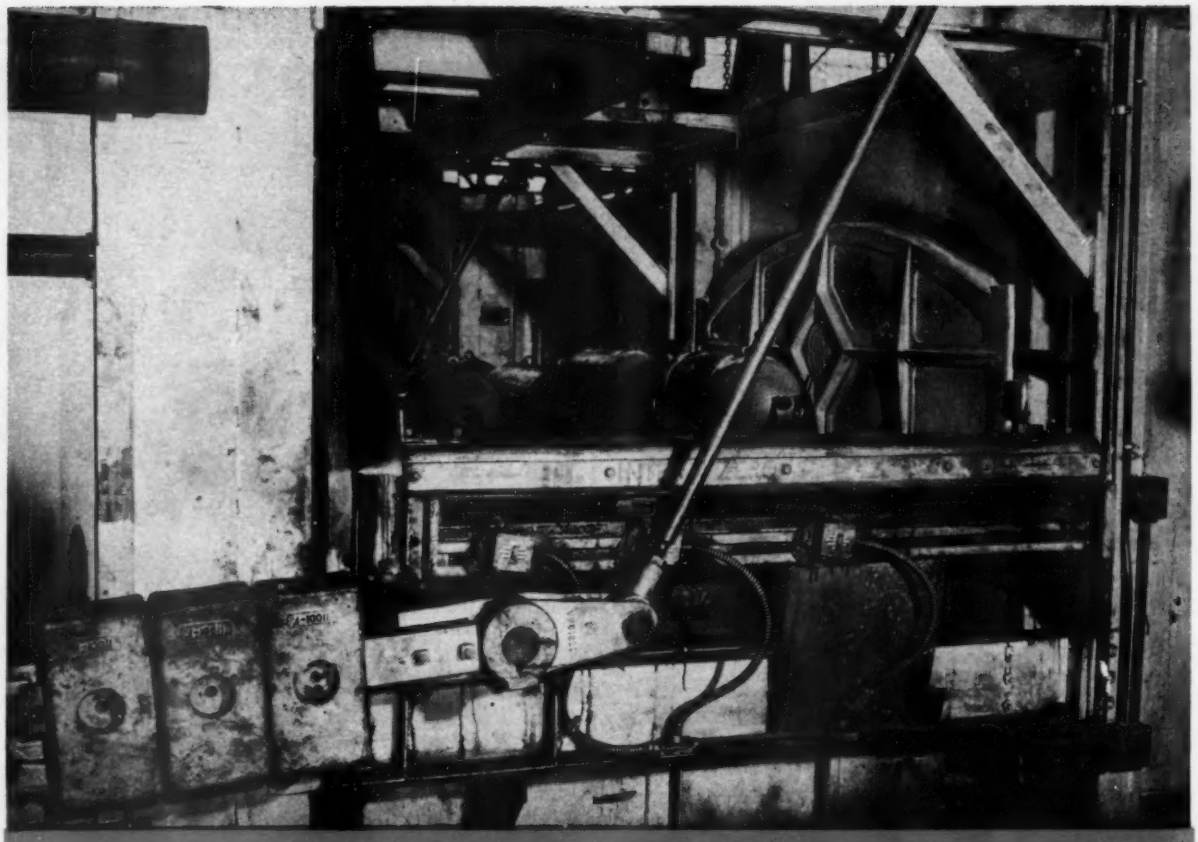
The first operation on the finished bomb forging consists of burning the fuze hole in the nose end. For this operation, a special unit was developed by Mechanical Handling Systems engineers. It consists of a set of power-driven rolls on which the bomb is rested for rotation in front of an Airco oxyacetylene cutting torch mounted on an adjustable bracket. The cut is started at the center of the nose, where the torch burns a hole through the metal. Next the operator moves the torch to one side a distance slightly less than the radius of the hole to be burned. During this operation, the bomb is rotated at about 2 r.p.m. and a hole ranging from 1⅝ to 1¾ in. in diameter is cut in the nose of the bomb.

From the hole burning unit, the bomb is transferred on a roller conveyor to a fixture where three bomb suspension lugs are tack-welded in position. This fixture is built onto the conveyor line and has a swinging arm which locates the forging between brackets holding the lugs in position. The tack-welding operation at this position consists of running a ⅛-in. bead along one side of each lug. Next, the bomb is moved along the conveyor line to a second welding position, where a similar bead is welded along the other side of each of the three lugs. Waste carbide in a water solution is brushed over the weld areas to prepare the metal for these welding operations. Lincoln 300-amp. arc welders and ⅛-in. coated electrodes are used.

Further along the same roller conveyor line, an inspector removes welding splatter with a chipping hammer and checks the location of the three suspension lugs with gages before transferring the bombs onto the lower deck of a two-level carrier carried by a continuously moving Monoveyor conveyor line. This conveyor delivers the bomb forgings to a roller conveyor line at any one of a number of welding booths in another location in the bomb department. Here, a second weld bead is laid across the ⅛-in. fillet on each side of each of the three suspension lugs



Two men load bombs onto the feed rails of each of the heat-treating furnaces. Two rows of bombs are moved through each furnace on cast shoes



Between the heat-treating and drawing furnace in each heat-treating line is an automatic quench station where the hot bomb bodies automatically are submerged in water, then raised and tilted for draining before being replaced on the cast shoes for transfer into the draw furnace

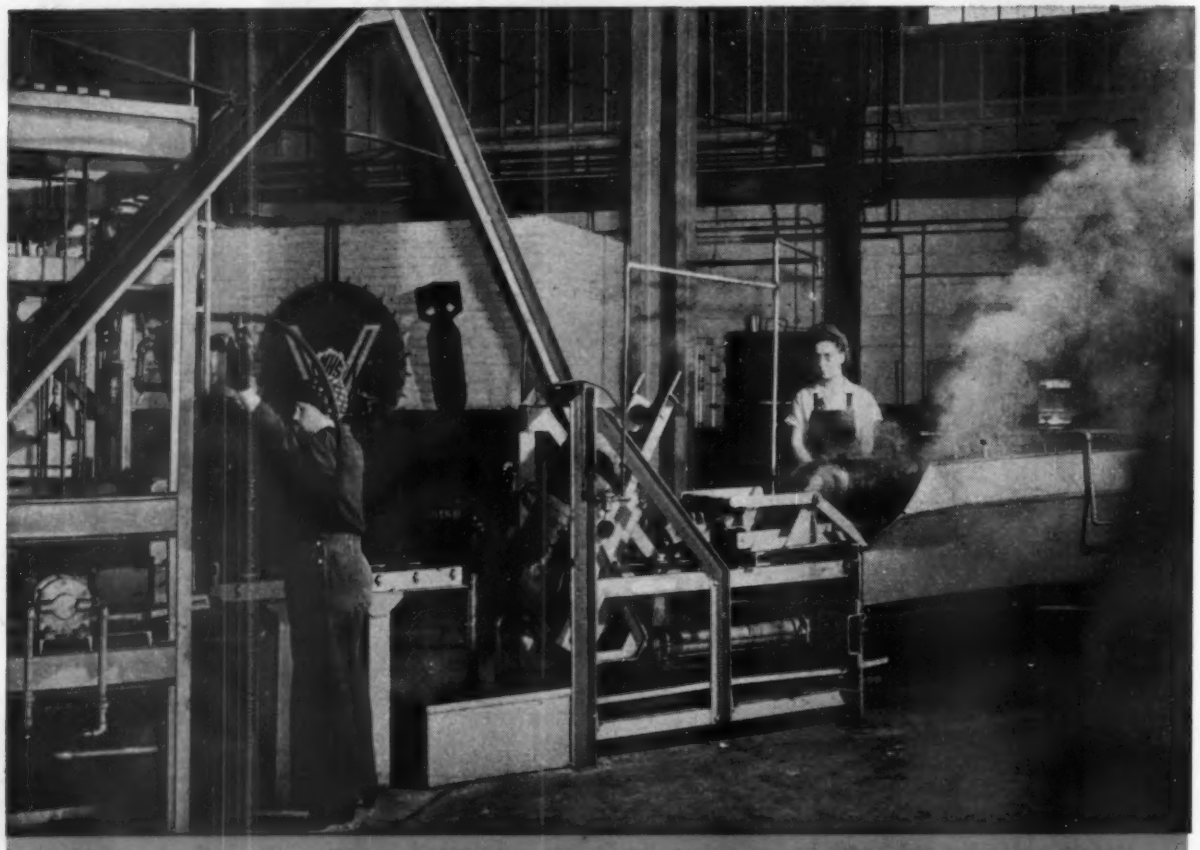
to form ¼ to ⅜ in. fillets. In each booth the roller conveyor section carrying the bomb is equipped with a foot-operated roller lifting device so that the bomb can be rotated about its longitudinal axis to bring the suspension lugs into convenient welding position. Girl welders use 300-amp. arc welders and 5/32-in. coated electrodes for making these welds. Finished bombs are moved out of the welding booths to a two-strand drag chain conveyor which carries them to a dumping station. Here a girl operates a special unit which tilts the bomb tail-end down so that scale and other foreign material is dumped into a box on the floor. This unit, in the level position, connects with a section of roller conveyor so that the bombs can be moved directly onto the upper level of the carriers on the same conveyor line which delivered the bombs to the suspension lug welding booths. Bombs on the upper level of these carriers are ready for heat-treating and the Monoveyor line takes the carriers past the furnace loading stations at a level where the upper station of the carrier is even in height with a roller conveyor table in front of each heat-treating furnace. Two men use an electric hoist to transfer bombs from this loading table to the rails of the furnace.

Two lines of bombs move through each heat-treating furnace at all times. Each bomb rests on a pair of cast chrome nickel steel shoes which are heat and abrasion resisting. Operation of the furnace is automatic, so that all loaders have to do is to keep the shoes loaded with bombs as each furnace cycle is completed.

Quenched Two at a Time

The hardening furnaces are Hagerr gas-fired pusher-type units with 24-ft. chambers. Each furnace is automatically timed for a 2 min. cycle and each bomb is in the furnace about 45 min. Upon discharge from the hardening furnace, each bomb automatically is quenched in a water tank and reloaded onto the rails of a pusher-type draw furnace. The automatic quenching unit lowers two bombs at a time into the quench tank, holds them in the water for approximately 1 min. 20 sec., then lifts them out of the water, tilts them to drain, and replaces them on the shoes from which they were removed when taken out of the hardening furnace. Water for the quench tank is circulated through a cooling tower so that the temperature of the bath is maintained at 75 to 83 F., depending on the carbon content of the steel.

Draw furnace temperature is maintained at 920 to 1,000 F., and each bomb is in the draw furnace



Heat-treated bombs are delivered to a gravity roller conveyor line on which they are passed under sprays of cooling water. In this line is an automatic tilting device which draws water from the bomb body before it is moved to the lug testing machine shown at the left

from 75 to 80 min. When cooled to room temperature after the draw, these bomb forgings have hardness of about 240 to 270 Brinell. To simplify machining operations, furnace cycles are adjusted to give as close to 255 Brinell as possible. Furnace unloaders at the delivery end of each draw furnace roll the bombs from shoes onto a roller gravity conveyor and lift the cast shoes onto the trays of carriers continuously carried around the furnaces by a Monoveyor conveyor line. This line automatically takes the shoes back to the loading position of each hardening furnace.

The gravity roller conveyor delivering bombs from the draw furnaces passes through a sheet-metal trough where water is sprayed over the bombs to cool them in order that they can be handled safely. Bombs are moved along this conveyor line onto an automatic tilt-and-drain unit so that water left inside the bombs from the cooling sprays can be drained away. When this tilt unit is in a nearly vertical position, an air blast is directed inside the bomb to assist in drying the interior surfaces. Bombs move automatically from this tilt unit onto a section of gravity roller conveyor for delivery to a special suspension lug testing machine. The automatic tilting unit has interlocking limit switches and solenoid-operated air valves to control its movements.

The suspension lug testing machine was designed and built by Mechanical Handling Systems engineers to meet specification requirements for pull testing each lug. Automatic jaws grasp each of the three lugs when a bomb is in the testing position, and each lug is subjected to an 800-lb. straight and side pull to make certain that the welds joining the lugs to the bomb body are sound. The woman operator of this machine has only to locate the bomb in its proper position and then start the machine cycle by push-button control. She also pushes tested bombs along the roller conveyor for delivery to nearby shot blasting machines.

Three men work at each of the Type ES-200 Pangborn special blast-cleaning machines. One of these men places special hooks on the bomb bodies and then, with the aid of another of the men, loads the bombs on suspension hooks in a shotblasting machine. The second man uses a 500-lb. capacity electric hoist, suspended from a hand-operated transfer crane, to lift the cleaned bombs so that the third

man, an inspector, can check the interior surfaces. The second man then transfers the bombs from the blast cleaning machine to a roller conveyor section where any uncleaned surfaces can be touched up with a hand-operated grinder. At this position, also, the suspension hooks are removed from the bombs bodies. Each of the blast cleaning machines is equipped with two Rotoblast units and two pressure blast cleaning nozzles, work handling units and a dust collector. These units are arranged to clean all interior and exterior bomb surfaces in an automatic cycle. Approximately 50 to 55 sec. are required for each cycle of the machine. No. 30 angular steel grit is used in the Rotoblast units as well as in the pressure blast nozzles. The four-position work fixture in each machine carries the bomb through the machine in an automatic indexing cycle.

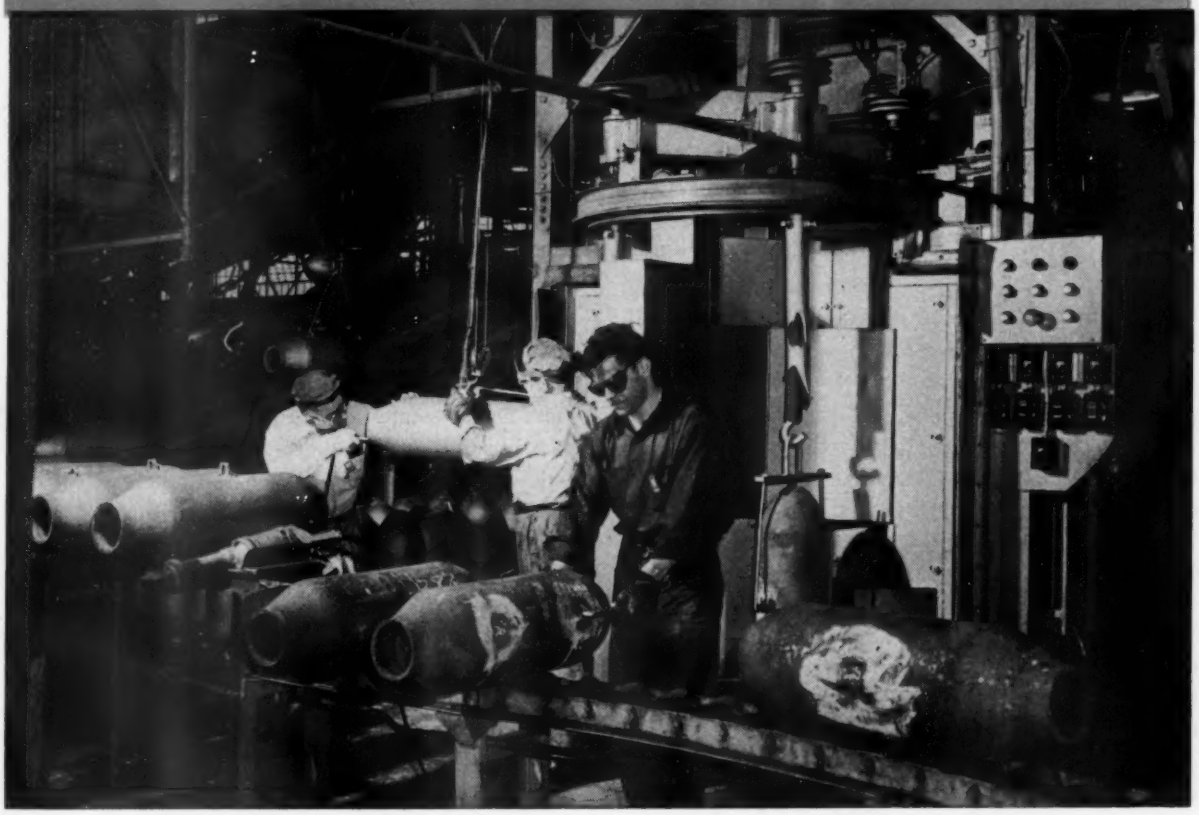
Cleaned and inspected bombs are suspended from hooks carried on a Monoveyor conveyor which passes the blast cleaning station. The conveyor has a decline at this position, so that the bombs need not be lifted, but rather are slid off of the conveyor table by movement of the conveyor. Hooks on the Monoveyor are on 4-ft. centers so that the bombs, when in a horizontal position, will not strike each other as they are being carried to the machine shop.

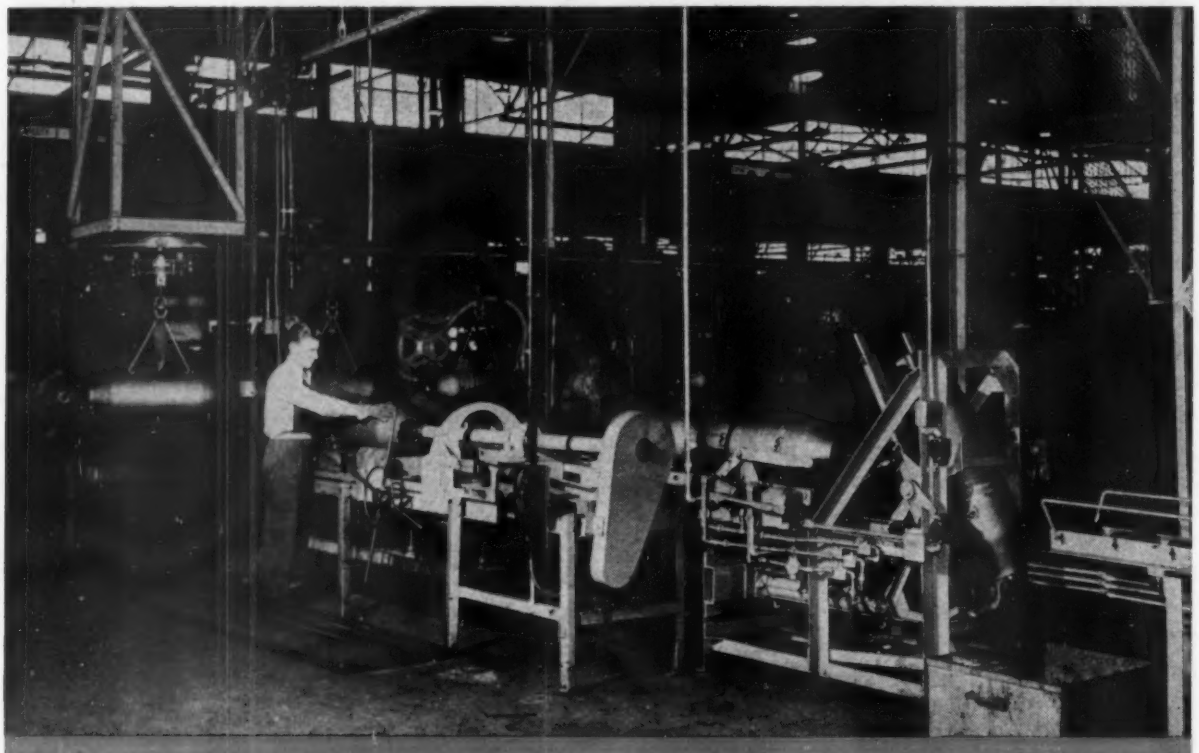
The continuously moving Monoveyor carries the cleaned bomb bodies through the machine shop. As needed, they are removed at one or another of several special multiple-spindle, hydraulic boring and tapping machines. These units were designed by Mechanical Handling Systems engineers and built by the Manistee Iron Works for this application. The bombs are handled to and from the machines by 500-lb. capacity electric hoists.

Bored and Tapped at Five Stations

The five-station horizontal boring and tapping machines are equipped to take either 250 or 500-lb. bomb bodies. The first station is used for loading and unloading the bombs. At the second station the burned out nose bore is increased to 2⅛ in. diameter with a four-flute core drill having Tantung-tipped cutting edges. This drill is rotated at 140 r.p.m. and the feed is 0.0045 in. per rev. Simultaneously, tools at the other end of the machine face and chamfer the tail end at 108 r.p.m. and 0.0045 per rev. feed. A ¾-in. square Tantung solid tool bit is used for the chamfering cut while a Vascoloy-Ramet tantalum-carbide-tipped ¾ in. square tool bit is used for the facing cuts. At the third station the nose bore is semi-finished with a Tantung-tipped four-flute core

Finish-forged bombs are cleaned inside and out in automatic Pangborn short-blasting machines with No. 30 steel grit. Each cleaned bomb is carefully inspected before transfer to the Monoveyor line shown in the background





Machined bomb bodies are removed by hoist to this special machine where a rose reamer is used to clean up interior surfaces at the nose end. Finished bodies are moved by roller conveyors to the automatic tilt-drain unit shown at the right

drill to 2¼ in. diameter at 140 r.p.m. and a feed of 0.0055 in. per rev., and the tail is rough bored with two carbide-tipped bits at 125 r.p.m. and 0.0045 in. per rev. feed. Using the same type of tools, the tail is finish bored in the fourth station at 125 r.p.m. and a feed of 0.006 in. per rev. At the same time the bore of the nose is finished with two solid Tantung bits in a special head which also carries two facing bits. This tool head is rotated at 140 r.p.m. with feed of 0.007 in. per rev. At the fifth station, both the nose and the tail ends are tapped with collapsible Geometric taps. The nose tap is rotated at 25 r.p.m. while the tail tap rotates at 20 r.p.m. Each of the independent tapping heads has leadscrew feed to insure good threads. Each of these special bomb machines has a 10 min. cycle, one bomb being finished every 2 min. In the operation of these machines, it has been found that it is desirable to alter the grind of the various cutting tools because of variations in the hardness of the bombs as they come through. Variations in carbon content, and in the heat-treatment applied, result in some variation in hardness. If these variations are not considered when grinding the tools, low tool life is experienced.

Machined bombs are returned to the Monoveyor where they are inspected with "go" and "not-go" plain and thread plug gages, and with a snap gage for checking the nose thickness. At frequent intervals, a profile gage is used to check the contour of the nose exterior surface. Bombs passed by the machine shop inspectors are carried by the continuously moving conveyor to a special reaming machine where the interior surface at the nose end is cleaned up to insure against rough surfaces which might result from the forging operation. Here, the operator removes the machined bomb from the Monoveyor to a fixture on the table of the machine, and advances the work piece against a continuously rotating high-speed steel rose reamer. This 4-in. diameter, ten-tooth cutter rotates at 50 r.p.m. on the end of a long bar which is inserted into the bomb from the tail end. About 1,000 to 1,200 bombs can be reamed with each grinding of this cutter.

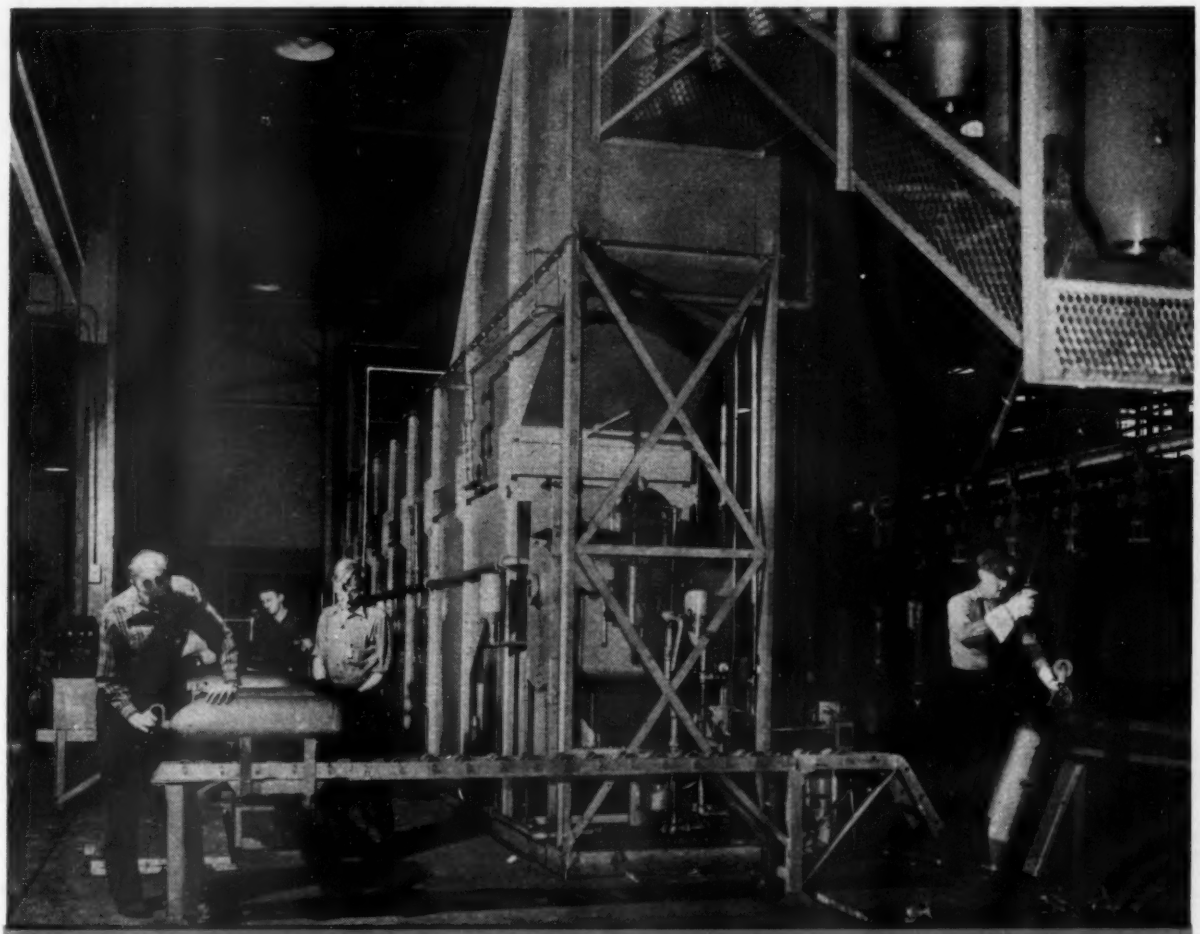
Upon completion of the reaming operation, the machine operator rolls the bomb onto a gravity roller conveyor at the back of the machine. This unit delivers the bomb bodies to another of the automatic tilt-drain units, where any coolant remaining in the bomb body, as well as chips left in the body by the preceding machining operations, drain into a floor pan. The tilt-drain unit is entirely automatic, and requires no operator. When the bomb is in a nearly

vertical position, an air blast assists in cleaning the interior surfaces. Bombs delivered from this unit travel down another length of roller conveyor to a drill press where the bomb is checked for the diameter of the surface faced at the nose end in one of the five-station machines. If this diameter is not large enough, the bomb is lifted into a vertical fixture on the base of the column-type drill press which has a face mill on the spindle. With the bomb in a nose-up position, the drill press operator takes a cut to provide a $\frac{1}{8}$ in.-wide seat all around the nose and so insure the fuze adapter having a good seat. The bomb is then returned to the conveyor for delivery to nearby inspection rails. Only about 25 percent of the bombs need this nose facing operation.

On the inspection rails, weld spatter is removed from around the three suspension lugs and inspectors check the nose and tail machining with gages. Bombs are passed along the inspection rails to a Mathews heavy-duty roller marking machine where the required identifying information is stenciled into conical tail end surface of the bomb.

Marked bombs are moved further along the rails, where a threaded nose ring is inserted for hanging the bomb from a Monoveyor conveyor line. The bomb is moved over to this conveyor on a roller conveyor section which drops the bombs, one at a time, onto a lead plate on the floor. The bomb falls tail-down against a steel rack beside the lead plate, so that it is supported in a vertical position for easy lifting to the moving overhead conveyor line with a 500-lb. electric hoist. This Monoveyor conveyor line carries the bomb bodies through a Model 325 Detrex vapor-spray-vapor degreaser and then into an automatic paint spray booth. Bombs are inspected visually just before they enter the spray booth, and sheet-metal shields are inserted into the tail end to protect the tail threads from the paint.

The automatic spray booth is equipped with two guns and gun moving equipment. The first gun coats the exterior surfaces of the bomb with an ammunition-type red paint while the second gun, which is on an extension tube, coats the inside surfaces with acid-proof black paint. The first gun, for the exterior surfaces,

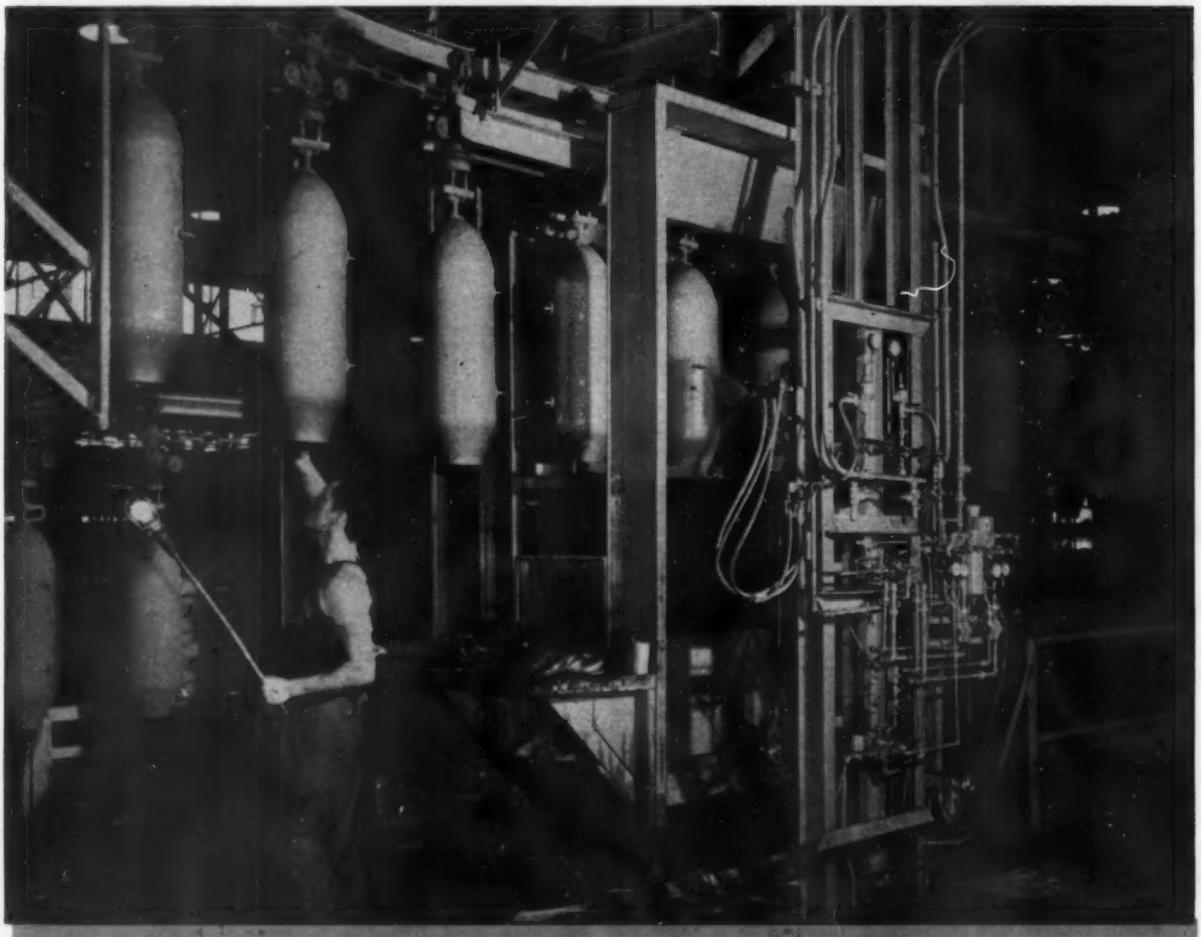


Bomb bodies are inspected, marked in a Mathews machine and fitted with special hooks in the nose ends, on the rails shown at the left. Then, they are transferred by roller conveyor to the hoist position at the right where they are lifted to the Monoveyor which carries them through the Detrex degreaser shown in the center

is cam-controlled so that the gun is directed at right angles to the various surfaces of the bomb. While in the paint spray booth, the bombs are rotated at about 80 r.p.m. by contact of a pulley on each carrier with a moving belt. Solenoid-operated air valves control the elevator carrying the spray guns so that the guns are not operated unless there is a bomb on the conveyor station in front of the gun position.

The Monoveyor carrying the bombs through the spray booth is of sufficient length to insure they are dry when they are delivered to the removing station along side the final assembly conveyor nearby. On this drag-chain conveyor which has cradle-type carriages placed on 2-ft. centers, the bombs are laid in a horizontal position. Here, each bomb is inspected and the nose adapter, base plug, fin locknut and nose closing plug is inserted and tightened. Also, two paper shipping bands are positioned and clamped. The assembly conveyor moves at about 4 to 4¼ ft. per min., which is slightly faster than the speed of the preceding conveyor. This slight increase in speed insures that the assembly conveyor will always have room for bombs as they are delivered for the final operations. Near the end of the assembly conveyor the bombs are carried through a two-station spray booth where operators with hand spray guns touch-up any unpainted or scratched surfaces. At the end of the assembly conveyor, following a final inspection, the bombs are removed by overhead hoist to racks which transfer them to freight cars at a loading platform nearby.

Adapters, base plugs, nose plugs, fine locknuts and similar small parts are machined in a separate group in this department. Here, each machine is served by a Monoveyor having suitable carriers and work-holding trays. After each operation, the work is replaced on a carrier on this conveyor and it is carried through a Model 325 Detrex degreaser before being returned to the same parts machining group for the next operation. Since the one conveyor serves all of the machines in this detail parts group, the operators can collect work from the conveyor as it is needed.



Degreased bombs are visually inspected then fitted with a mask in the tail end before movement into this automatic paint spray machine where exterior and interior surfaces of each bomb are coated with paint while being rotated on conveyor hangers

Circular Forming Tool Blanks and Mounting — I

AN AMERICAN STANDARD for circular and dovetailed forming tool blanks was approved in 1936 by the American Standards Association. Later, Technical Committee No. 10 of the American Society of Mechanical Engineers decided to include standards for the holding elements. Therefore, the entire proposal was reviewed, and certain minor changes were made relative to tolerances. Upon approval of the sponsoring organizations — the A.S.M.E., the Society of Automotive Engineers, and the National Machine Tool Builders Association, the revised and enlarged standard was designated as an American standard by the ASA under the title, "Circular and Dovetailed Forming Tool Blanks—And Associate Mounting and Clamping Elements for Holders Used on Automatic and Other Screw Machines—ASA B5.7-1943."

The purpose of the standard, of course, is to provide interchangeability and to permit reduction of the number of blanks in use. To establish a minimum number of blank sizes, the machines have been classified into six groups of comparable stock capacities. Each group of machines takes a definite size tool and the holders are provided with suitable mounting or clamping devices. Group numbers identify the size of tool with the machines in which it is used.

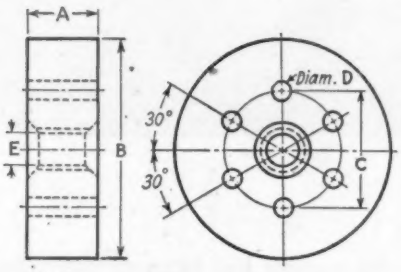
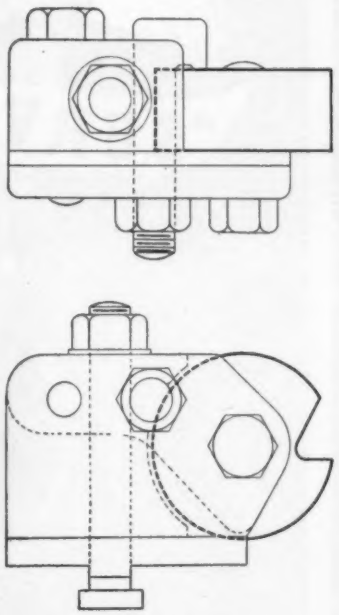


Table 2 Dimensions for Finished Blanks for Circular Forming Tools With Threaded Mounting Hole

Group Number	Basic Blank Size[1,2]	Diameter B		Width A		Adjusting Holes[3]		Diam of Threaded Hole[5]	Pitch of Threaded Hole[5]
		Max	Min	Max	Min	C[4]	D[4]	E	E
1	1 3/4 × 1/4	1 25/32	1 49/64	9/32	17/64	No pin hole		3/8	16
	1 3/4 × 3/8	1 25/32	1 49/64	13/32	25/64			3/8	16
	1 3/4 × 1/2	1 25/32	1 49/64	17/32	33/64			3/8	16
	1 3/4 × 3/4	1 25/32	1 49/64	25/32	49/64			3/8	16
	1 3/4 × 1	1 25/32	1 49/64	1 1/32	1 1/64			3/8	16
2	2 1/4 × 3/8	2 9/32	2 17/64	13/32	25/64	1 3/8	3/16	1/2	13
	2 1/4 × 1/2	2 9/32	2 17/64	17/32	33/64	1 3/8	3/16	1/2	13
	2 1/4 × 3/4	2 9/32	2 17/64	25/32	49/64	1 3/8	3/16	1/2	13
	2 1/4 × 1	2 9/32	2 17/64	1 1/32	1 1/64	1 3/8	3/16	1/2	13
	2 1/4 × 1 1/4	2 9/32	2 17/64	1 9/32	1 17/64	1 3/8	3/16	1/2	13
3	3 × 1/2	3 1/32	3 1/64	17/32	33/64	1 1/2	3/16	5/8	11
	3 × 3/4	3 1/32	3 1/64	25/32	49/64	1 1/2	3/16	5/8	11
	3 × 1	3 1/32	3 1/64	1 1/32	1 1/64	1 1/2	3/16	5/8	11
	3 × 1 1/4	3 1/32	3 1/64	1 9/32	1 17/64	1 1/2	3/16	5/8	11
	3 × 1 1/2	3 1/32	3 1/64	1 17/32	1 33/64	1 1/2	3/16	5/8	11

All dimensions except pitch are given in inches.

[1] Blanks are designated by the basic outside diameter and width.
[2] Blanks made of high-speed steel shall be stamped H.S.
[3] Six adjusting holes shall have a minimum depth of 1/4 in., greater depth or through holes optional. Adjusting holes shall be equally spaced on the *C* diameter circle and slightly chamfered.
[4] Diameter of adjusting holes *D* shall be +0.002.
[5] Diameter *C* of location circle shall be ±0.002.
[6] The threaded hole *E* shall be held within Class 2 tolerances (NC 2, ASA B1.1–1935). Both ends of threaded hole *E* shall be chamfered 35 deg.



Circular tool blanks for Group 1 machines have no adjusting-pin holes; hence a friction plate is used to adjust the cutting edge to the work center

Table 1 Machine Classification

Group Number	Type of Machine	Maximum Capacity*
1	No. 00 Brown & Sharpe	3/4
	No. 19 Brown & Sharpe	3/8
	Index "0"	7/16
	3/8 Cleveland	5/8
2	3/8 Gridley	3/8
	1/2 Davenport	7/8
	9/16 Acme Gridley	9/16
	No. 0 Brown & Sharpe	5/8
	5/8 Cleveland	3/4
	5/8 × 7/8 Cleveland	1 1/16
	No. 204 New Britain	5/8
	7/8 Greenlee	1
	7/8 × 1 1/4 Cleveland	7/8
3	7/8 Gridley	7/8
	1 Acme Gridley	1
	No. 172 New Britain	1
	No. 2 Brown & Sharpe	1 1/8
	1 1/4 Gridley	1 1/4
	1 1/4 Cleveland	1 1/4
	1 1/4 Cleveland	1 3/8
	1 1/4 × 1 1/2 Cleveland	1 3/4
	1 1/4 × 1 1/2 Cleveland	1 1/2
	1 1/4 Greenlee	1 1/4
	1 3/8 Gridley	1 3/8
	1 1/2 Greenlee	1 1/2
	1 5/8 Gridley	1 5/8

All dimensions are given in inches.

* The group classification numbers apply to all machine models of the respective makes listed having the maximum capacities indicated.

STARRETT TOOLS

THE need for dependable precision tools has been so overwhelming that Starrett toolmakers of necessity concentrated on those of greatest usefulness and stamina.

Starrett's "wartime" line comprises the tools that have proved themselves under today's extreme service demands. These tools are going to provide the finest possible nucleus for the great re-tooling job of post-war industry. Starrett Tools will not be found wanting when that time comes.

ARMY E NAVY

THE L. S. STARRETT CO · ATHOL · MASSACHUSETTS · U. S. A.

World's Greatest Toolmakers

Now, with Service Star

STARRETT

PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES

Circular Forming Tool Blanks and Mounting—II

To facilitate procurement of tool blanks, circular forming tools are designated by outside diameter and width of tool blank. A circular tool blank is a disk with a plain or threaded mounting hole, and a number of adjusting holes. Circular blanks are used for making forming and cut-off tools by machining the periphery to the form of the product to be made. A notch is ground in the periphery to provide a cutting edge in the form tool.

A circular forming toolholder is a device for holding circular cutting tools in proper relation to the work as it is actuated back and forth on the toolslide of an automatic screw machine. A center bolt and hook bolt are generally provided for clamping the tool in the holder. It is not the intention of this standard to provide interchangeability of holders among various makes of machines, except for the mounting or clamping details of the tool member.

Material published herewith concerns circular forming tools and their associated mounting or clamping means as related to machine groups 1, 2 and 3. Later installments will cover circular form tools for machine groups 4, 5 and 6, and dovetailed forming tools for all six groups of machines.

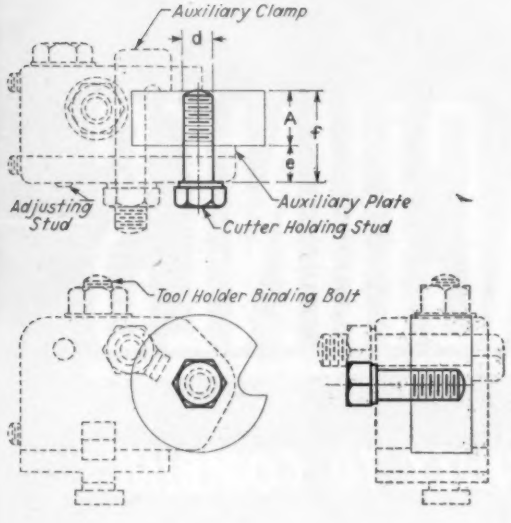


Table 5 Typical Circular Forming Tool Holder for Machines in Group I

Machine Group Number	Width of Blank A	Bolt		Tool Post e
		Length f[1]	Thread Size d[2]	
1	1/4	3/4	3/8–16	7/16
	3/8	7/8	3/8–16	7/16
	1/2	1	3/8–16	7/16
	3/4	1 1/4	3/8–16	7/16
	1	1 1/2	3/8–16	7/16

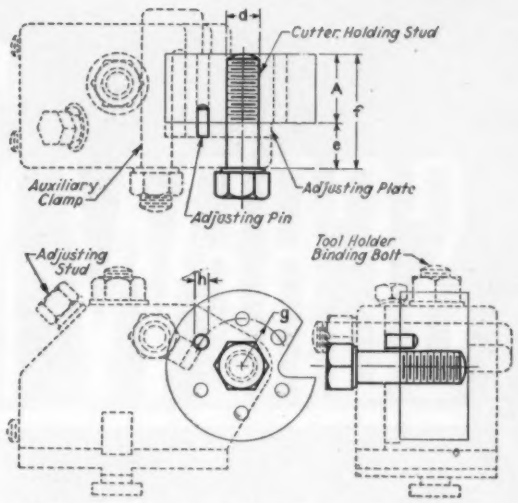
All dimensions are given in inches

Tolerance for dimensions not otherwise specified shall be held to ±0.010.

This holder is intended for the use of cutters without adjusting pin holes.

[1] Tolerance for length of bolt is ±1/32.

[2] Screw thread shall be made to Class 2 (NC 2, ASA B1.1–1935).



Positive adjustment of the cutting edge to the work center is attained by an adjusting stud transmitting motion to a plate with a pin that engages one of the six holes in the side of the circular tool

Table 6 Typical Circular Forming Tool Holder for Machines in Groups 2 and 3

Machine Group Number	Width of Blank A	Bolt		Adjusting Pin		Tool Post e
		Length[1] f	Thread Size[2] d	Radius[3] g	Diameter[4] h	
2	3/8	1 1/8	1/2–13	11/16	0.185	3/4
	1/2	1 1/4	1/2–13	11/16	0.185	3/4
	3/4	1 1/2	1/2–13	11/16	0.185	3/4
	1	1 3/4	1/2–13	11/16	0.185	3/4
	1 1/4	2	1/2–13	11/16	0.185	3/4
3	1/2	1 3/8	5/8–11	3/4	0.185	13/16
	3/4	1 5/8	5/8–11	3/4	0.185	13/16
	1	1 7/8	5/8–11	3/4	0.185	13/16
	1 1/4	2 1/8	5/8–11	3/4	0.185	13/16
	1 1/2	2 3/8	5/8–11	3/4	0.185	13/16

All dimensions are given in inches.

Tolerances for dimensions not otherwise specified shall be held to ±0.010.

[1] Tolerance for length of bolt is ±1/32.

[2] Screw thread *d* shall be made to Class 2 (NC 2, ASA B1.1–1935).

[3] Tolerance for the radius of the adjusting pin *g* is ±0.001.

[4] Tolerance for the diameter of the pin is +0.000 −0.001.

New Britain

... the name to remember

FOR

SCREW MACHINES

. . . OF INCOMPARABLE ABILITY TO COMBINE ACCURACY WITH HIGH PRODUCTION

New Britain also builds a complete line of Chucking Machines, four, six and eight spindles up to 10¼" capacity.

NEW BRITAIN-GRIDLEY MACHINE DIVISION
THE NEW BRITAIN MACHINE COMPANY • NEW BRITAIN, CONNECTICUT

★

A Fair Price Formula

IF QUOTED correctly, Walter Reuther of the United Automobile Workers charges that industry is campaigning to acquire government-owned machine tools for 10 to 15 percent of the original cost.

We are convinced that if Mr. Reuther had known the real facts, he would not have made such a charge.

The automobile industry normally is the biggest user of machine tools. Recently appearing before the Truman Committee, Mr. K. T. Keller, president of the Chrysler Corporation, advocated the sale of government-owned machine tools to private industry at a schedule that roughly would average 50 percent of the original purchase price, with many machines selling at considerably more than that.

Machine tool builders, as an industry, have not formally endorsed any plan, but their thinking is along the line of charging a minimum of 45 percent of the original price, and ascending from that low point.

Government agencies involved—Army, Navy, Maritime Commission and Defense Plant Corporation—are thinking in terms that do not come anywhere near representing give-away prices.

Only in the case of highly special machines designed and built for special purposes and having slight adaptation to peacetime use is the suggestion made that prices dip below a moderate level. Otherwise these special machines could not be disposed of at all.

The task is very difficult of arriving at an equitable price schedule for surplus machine tools that will result in a meeting of minds of buyers and sellers alike.

If the price is too low, the government will be in the painfully embarrassing position of being accused of giving away its property to greedy buyers. The politicians don't want that to happen. Neither do industrialists.

The one development that would give machine tool builders a nightmare would be for surplus machine tools to be dumped by the government at 10 to 15 cents on the dollar. That was exactly what happened after the last war, helping mightily to spell ruin in the succeeding years to the market for new machine tools.

Fortunately all the interested groups—the government, industry and machine tool builders—are agreed on the desired objective: a price formula fair and reasonable to all concerned.

Only in that way can the surplus machine tool problem be worked out without being an iron collar around the neck of an industry vital to our national economy.

Only in that way can a fair disposition be made of a complex, explosive and serious problem.

Burnham Finney

Gaging Business

Production climbs toward European invasion, while WPB blocks use of idle facilities for civilian production. War output seen rising, shifting. Many components taken from critical list. Materials generally easier. Manhour output up. Russia may take quarter of this year's machine tool output

WPB Holds the Line

As the invasion of the Continent draws nearer, war production is reaching new heights. Concurrently, Washington is more firmly opposed than ever to resumption of any important civilian goods manufacture until beachheads have been well established in Europe and the new needs growing out of the invasion are learned. Even if raw materials and manpower and plant facilities become available, WPB is adamant on the matter of holding these assets for possible unforeseen emergency requirements, in line with the wishes of the armed services.

January output of planes totaled 8,789 units, a gain over December of 5.4 percent measured by airframe weight. The new schedule calls for 106,000 planes this year, averaging 10,000 lb. per plane compared with 8,630 lb. in 1943. Almost every aircraft plant in the country met or exceeded its quota last month. Merchant ship construction, continuing at an all-time peak, is changing character, with the first Victory ships to be delivered this month. Two were launched in January. Liberty ships, that made up two-thirds of last year's tonnage, will drop to less than half of the 1944 total. The emergency tanker program will end this month. Navy fleet-building will be half again as large this year as last, when two huge battleships, 11 cruisers, 15 aircraft carriers, 50 carrier escorts, 128 destroyers, 306 destroyer-escorts and 56 submarines were completed.

Estimate '44 Production

The war production program for this year adds up about as follows: small arms and small arms ammunition, bombs, motor carriages for self-propelled guns and tanks will be down; Army artillery, mortars and rocket launchers will decline 38 percent, but the heavier-type guns will rise; artillery ammunition will go up sharply; ground radio equipment will slump further as airborne signal equipment soars; heavy trucks and invasion craft will be at the top of the list of 1944 "musts." Production problems this year will be largely specialized. To keep pace with battle experience, designs will be revised and perfected.

Critical Components Easier

The critical components situation is much improved. The number of tight components has been cut from around 250 to only 10. Bearings and heavy castings continue short because of a lack of manpower. Materials in general are in good shape, except steel plate which is required in large quantities for landing craft. There is a surplus of structural steel. More copper is being used for shell as the Army shifts back from steel. An ample volume of aluminum is at hand. Nowhere near the full capacity of alloy steel mills is currently being utilized for war purposes.

As cancellations and cutbacks occur, prime contractors are concentrating in their own plants the remaining volume, cutting off subcontractors wherever the work can be done at home. Prime contractors also are taking over specialty jobs done heretofore by subcontractors who had developed certain skills, designs or methods of production. The result is that a larger percentage of the total war production job apparently will be done by a smaller number of contractors, and that prospects for smaller companies become less favorable.

Manhour Output Worries Labor

Reports are becoming more common of increased manhour output in war plants. This means further cuts in the working forces to stay within assigned schedules. Organized labor is known to be concerned over the recent shift that has given the military such complete authority over all civilian-production policies.

Components Stop Some

Orders are to be placed at once to enable railroad car builders to turn out 60,000 to 70,000 all-steel freight cars this year. That is as many as they can make in view of direct war commitments. Railroads are more willing to buy cars now that steel can be used again instead of wood. Locomotive and passenger-car building facilities will be fully engaged throughout 1944. Washington believes it impossible to produce automobiles, refrigerators, washing machines and similar consumer goods until components are available that now are needed for war purposes and, in the case of motor cars, until cutbacks are much more extensive than at present.

Prediction Stands Up

Machine tool production is still slipping, but indications are that total output this year will not be less than the $375,000,000 earlier predicted. It would not be surprising if Russia took as much as 20 to 25 percent of the industry's entire output during 1944. The Soviet's requests far exceed those from any other country.

Piat—The Projector Infantry Anti-Tank, recently introduced by Canadian and British troops on the Italian front, has been successful against pillboxes, concrete emplacements and similar targets. It is light, portable, weighs 33 lbs. and fires a 2¾ lb. bomb which can penetrate 4 in. armor plate

Simple Plan Outlined for Disposal of Surplus Tools

Prices to be based on original price less 25 percent, minus one percent a month during period of war production use; total deductions not to be in excess of 55 percent

WASHINGTON—Though the machine tool industry has not formally committed itself to a plan for disposition of government-owned surplus machine tools after the war, the industry is thinking in terms of the simplest possible procedure to get the problem licked quickly, and of a price schedule that gives a fair return to the government at the same time that it offers an inducement to manufacturers to buy from this stock.

Prices would be based on the original invoice price less 25 percent. An additional one percent per month would be subtracted for the period of war use. If machines are bought while still on war work, the one percent monthly deduction would continue until termination of the war contract. Total deductions from the original price would not exceed 55 percent.

Would Equip Arsenals

The government should decide promptly what arsenals, plants and yards it wishes to retain for future emergencies, together with such machinery and equipment as the armed services declare they should have as a strategic reserve, according to machine tool leaders. After contractors with options to purchase machine tools have a chance to exercise those options, the government shall choose from the remaining equipment the most modern and critical types to furnish its own plants and also shall set aside a surplus of such machine tools to avoid a shortage in case of a possible future emergency. These surplus machines are to be slushed and stored in government warehouses.

If the government no longer needs a machine for war work, it shall give the contractor a 60-day option to buy it. If he does not want it, he may remove it to another location in his property. Within 60 days after the contractor says he does not wish to buy the machine, the government must take it out of his plant unless the government and the contractor agree upon a satisfactory rent for storing it there.

Must Remove in 30 Days

In case a contractor no longer requires a machine for war work and does not want to buy it, he may notify the disposal authority and waive his option to purchase. Under such circumstances the government must remove the machine from his plant within 30 days. A lessee or user should have the privilege of buying a machine before the government decides it no longer is needed for war work, provided the machine is continued on war production as long as the government requires it.

If a machine tool is still unsold 90 days or more after it has been offered to any domestic buyer, established schools and colleges may buy it at one dollar a machine for educational purposes. Any foreign buyer may purchase unsold machines at the scheduled price 90 days after they have been offered to domestic buyers.

"As Is and Where Is"

Any rebuilding or reconditioning of machine tools is to be done at the expense of the buyer, who must make his own arrangements with the builder or with his authorized agents. Machine tools are to be sold "as is and where is." Special attachments or accessories need not be bought with the machines. If a customer wishes them, the same price basis holds as for the machine tool itself. Prices are to be cash within 30 days. In cases where financing is required, adequate private facilities already are believed available. If a buyer does not get possession of a machine immediately but must wait until its war work is completed, cash will be due within 30 days after the war job is finished.

Members of the industry stress the simplicity of the proposed plan. No conditions are attached to sales, such as a commitment to scrap replaced machines or to demonstrate that the purchase of the machine will increase production. There is to be no recourse if the buyer finds the machine has been damaged, though he will have an opportunity of inspection in advance of sale.

TOO EARLY TO PROPHESY

COLUMBUS, OHIO—The length of time it will take to convert the automobile industry to peacetime production cannot be foretold, "until we know the relationship of the products needed at the last minute," said Charles F. Kettering, vice president and director of research for General Motors, here for a two-day meeting of the National Forecast Council.

"Nobody's opinion is worth a nickle until we know the way the war is going to end," he stated.

Renegotiation of Machine Tool Makers Stays, Says Conference

WASHINGTON—After a few days of hopeful glimmering on the horizon, the 1943 Senate tax bill clause exempting producers of durable machinery from renegotiation was eliminated by the House-Senate conference.

Must Consider Amortization

However, the conference did retain the requirement that renegotiators take into account the recomputation of amortization deduction, and that it shall be retroactive to the beginning of the renegotiation statute.

As finally tailored, the renegotiation section of the belated 1943 tax bill makes possible appeal to the U. S. Tax Court by contractors whose renegotiation was unilateral.

Renegotiation Terminus Set

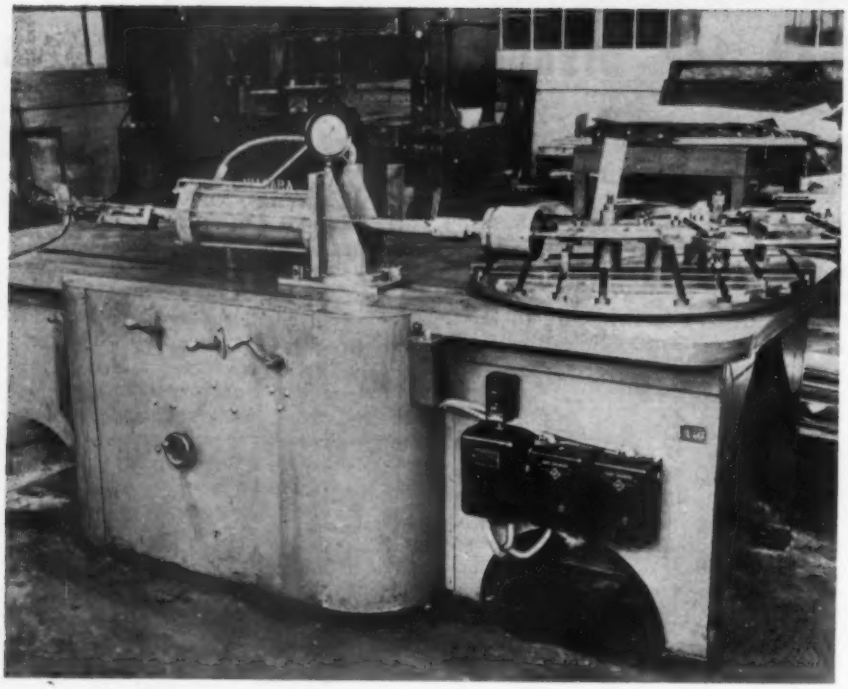
Renegotiation will cease December 31, 1944, or any time earlier, or not more than six months later, if the President should decide that price conditions warrant the action.

Eliminated by the conference were the provisions which would have directed price adjustment boards, in making determinations, to "consider" each industry's problems in connection with reconversion and profits remaining after estimated federal taxes. This is but little loss, for it merely directed that these factors be "considered."

May Pro Rata Renegotiation

On long-term contracts and those being renegotiated individually, instead of on the basis of the contractor's fiscal year, the government will have jurisdiction over the profit attributable to the portion of the contract completed when the renegotiation law terminates. For other contractors, the termination will depend on their method of accounting. Those on a cash basis will be renegotiable on profits received up to the termination date, those on an accrual basis on profits accrued.

The power to reduce prices is not limited to the provisions of the renegotiation law and appeals of aggrieved persons go to federal district courts.



Stretching Saves—The Roto-Stretcher, developed by Goodyear Aircraft Corp., forms parts with contours up to 360 deg., readily doing operations which previously had to be done in conventional mechanical dies. Parts are formed without wrinkles. Costly handwork is unnecessary

Arrange South African Tool Sales via Trade Channels

WASHINGTON — Direct contact between South African firms which would import small and hand tools for non-military use, and United States manufacturers and exporters of these items, will be possible under an arrangement announced by the Foreign Economic Administration and the Union of South Africa Government Supply Mission.

The adoption of this plan follows recent suggestions by a group of United States tool experts, and was made possible by some improvement in the domestic supply situation.

Tools for military use will continue to move through government channels.

To Estimate Needs

Under the arrangement, each South African merchant will submit orders for six months' forward requirements, marking on each the name of the desired shipper. These individual orders will be assembled in South Africa. All orders upon a given United States supplier will be grouped together, approved and forwarded directly to designated suppliers in the U. S.

The supplier will use the summary sheet to prepare a separate application for priority rating for all tools in each of the Controlled Materials Plan product groups of the WPB. Rating applications must show all available information regarding end use and state that the tools concerned were included in the 1944 requirements program for South Africa.

Invasion Film Available

WASHINGTON — "Battle for the Beaches," a swift moving film preview of the all-out invasions aimed toward Berlin and Tokyo, is ready for showing to war workers. Produced by the Navy, it is based on actual combat scenes, and vividly portrays the high cost of men and materiel involved in storming enemy beaches.

The picture traces the many amphibious operations to date that have turned the course of the war to the favor of the United Nations. It also shows captured German film depicting the Nazi version of the Dieppe "Dress Rehearsal."

War plants desiring to exhibit "Battle for the Beaches" should write the Industrial Incentive Div., U. S. Navy, 2118 Massachusetts Ave., N.W., Washington 25, D. C. It is available in both 16 and 35 mm. sound versions. Quentin Reynolds is the narrator.

ASTE Meeting Planned

DETROIT—The annual meeting of the American Society of Tool Engineers has been scheduled for March 26 to 28, inclusive, Bellevue Stratford Hotel, Philadelphia, Pa. The annual meeting of the board of directors will occupy the entire first day. Technical sessions will fill the morning, afternoon and evening of the second day, and morning and afternoon of the third. The annual banquet will conclude the schedule on the evening of March 28.

No machine and tool progress exhibition is scheduled, and it is expected the Society will hold no shows prior to the termination of European hostilities. Plans are being projected, however, for the holding of the largest exhibition in history of production equipment, tools and machines, approximately 90 days after the end of the war in Europe.

Perfected Gas Turbines Save Small Ships Space and Cost

WASHINGTON—Small, 7,200 tons, ocean-going ships can be built more cheaply and carry more cargo, through the installation of constant pressure gas propulsion turbines of a type developed by Maritime Commission engineers and the National Research Commission, and now being manufactured by the Elliott Company.

While there has been some foreign use of auxiliary gas turbines, this is understood to be the first designed for main propulsion units. Coupled to a conventional electric drive, it will develop between 2,000 and 3,000 hp. Adaptation to larger vessels hinges upon further experiments.

Boiler is Eliminated

The constant pressure combustion turbine, like the steam turbine, is essentially a series of precision-built fins against which blows a stream of gas formed by burning fuel oil. However, in the gas turbine the products of combustion pass directly through the blades, instead of through the boiler to generate steam.

The principal of the gas turbine has been known for a hundred years, but airplane supercharger research resulted in the perfection of its blades, and metallurgists recently discovered a material which would maintain its strength under high operational heat.

Expect Superior Performance

Ultimately the power plant is expected to operate about 25 percent more efficiently than steam turbine installations of comparable size. An added advantage is that it occupies less engine room space and is lighter than steam turbine installations. It requires neither boiler nor large quantities of fresh water. Cost is thought to be about the same as that of steam turbines used in conjunction with boilers; hence the elimination of boilers represents a saving in cost and maintenance, while increasing a ship's carrying capacity.

Inside Detroit

OPA limitations result in development of bottleneck in foundries, seriously retarding the landing craft program. New contracts take up slack in shifting automotive picture. Can't discern pattern in the strikes. No partial car production

BY SILER FREEMAN

Bottleneck In Castings The gravest bottleneck for the automotive industry's production of war goods is fast developing in the foundry end. The Office of Price Administration is being held to blame for it because of its announced policy, strictly adhered to, that the only increases it will permit are those merely to cover costs and not profits.

The grey iron foundries are finding it difficult to break even on the 3 to 4 percent profits permitted to them, a survey of the industry recently showed. They are refusing to bid on difficult jobs and when rejects become too high, they have tossed up contracts.

Because of this situation, production of engine blocks which are an important part of the landing craft program, has fallen far behind and threatens to disrupt the one item which has been the No. 1 spot on the invasion preparedness agenda. In addition to the profit angle, the manpower situation in the foundries continues to bring deep concern. Despite all the War Manpower efforts and directives, no relief is in sight.

Makes Cargo Plane Engines Reflecting a cross section of the trend in the automotive industry which will see no mass layoffs despite sharp cutbacks and cancellations, Buick has just revealed a new Army Air Forces contract for cargo plane engines. This engine of the same type that the company now makes for the Liberator and will be manufactured on the same machines and assembled on the same lines set up for the Pratt & Whitney R-1830-43.

The new engine is a 14-cylinder radial developing 1200 horsepower and is of the twin-row Wasp type. It involves millions and the company is now tooling up for it, according to Harlow H. Curtice, general manager of Buick.

The new engine will be made both in Flint and the Melrose Park, Ill., plants. Half of the fabrication will be in Flint while the machining, final assembly and testing will be in the Chicago plant.

Buick recently was forced to lay off nearly 3,500 workers because of cutting back of the Liberator engine program. The new contract is expected to absorb most, if not all, of the employees laid off.

This contract illustrates why the industry is not worried about cancellations. As soon as it is cut or stopped on one type of work, there is another that the government wants it to get busy on.

A similar experience is expected at the Dodge truck plant. A heavy cutback is expected in military trucks which Dodge has been putting out in tremendous quantities. The new program calls for military trucks of much larger sizes. But Dodge will be given a substantial part of the civilian truck program and will use most of its working staff, the rest being shifted to other divisions of Chrysler.

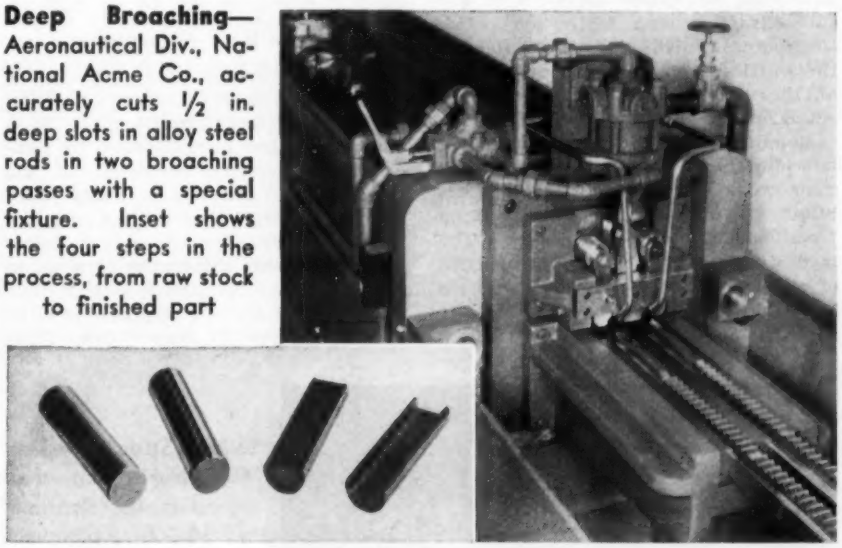
Those Strikes Are Here Again Once more the automotive industry is being plagued with sporadic strikes and work stoppages. The tie-ups have as yet not been too serious, as far as production is concerned, but have caused worry because of the implications.

The plant executives have been asking themselves if it is because contract renewals are up or is it because the "Little Steel" formula is under fire or because contract cancellations and cutbacks are beginning to be felt in isolated spots.

The strikes have hit at some vital products. For instance, the most recent was a tie-up in the Chevrolet plant making truck parts and amphibious jeep parts. Another threatened to shut down Willow Run when workers in the center wing section started a virtual "sitdown," probably the first since the ones which shut down most of the industry before the war. Still another held up the output of Pratt & Whitney engines at Ford's Highland Park and River Rouge plants.

No Pattern Is Apparent The true significance of these outbreaks is puzzling the plant chiefs. In the case of Chevrolet Gear & Axle Div., the complaint was of speed-ups by management. Head of the plant local charged that the company was trying to get the output up from 6.6 pieces per hour in the Weiss universal joint department to nine. The company charged that the workers were not meeting production standards.

At the bomber plant, the dispute was over a 10-cent raise in pay. The Pratt & Whitney engine trouble was over disciplinary action.



Deep Broaching—Aeronautical Div., National Acme Co., accurately cuts 1/2 in. deep slots in alloy steel rods in two broaching passes with a special fixture. Inset shows the four steps in the process, from raw stock to finished part

All fail to add up to the same answer. But everyone agrees that the unrest is becoming worse rather than better, despite the criticism from all sections, including the fighting men's bitterness against such tactics.

Sees no Partial Car Production Henry Ford II has lined himself up with the faction of automotive manufacturers that sees no chance of car production while the war lasts. Young Henry goes even farther than some, predicting that there will be no new auto-

mobiles "until our boys are home," meaning, evidently, that there will be no partial resumption even if Germany should be whipped first.

The young Ford heir emerged as a public figure here at the recent National Automobile Dealers Association annual meeting. In a speech, which was said to have been written entirely by himself, Henry made a plea for the automobile industry to provide a secure existence for the employees as well as a worthwhile product.

Young Ford, as vice president in charge of sales for his grandfather's company, also blasted the artists' conception of the postwar car. He called it not the "car of tomorrow" but perhaps "the car of the day after tomorrow." Which makes the opinion about unanimous among car manufacturers.

Unemployment Begins to Show

Signs that cancellations of contracts in the Detroit area is beginning to hit employment are noted in the growing list of claims for unemployment compensations. The number of claims has been almost negligible the past year and the job insurance fund to pay benefits is now around $211,000,000.

But in recent weeks, the claims have gone up to about 400 a day. Most of them come from workers in small plants which have had contracts cancelled and which have not yet found new ones to replace them. Most are subcontractors and while the prime contractors have new assignments, the shifting from one kind of work to another has worked some hardships.

But in the larger plants, which occasionally have had temporary layoffs due to the same causes, bosses managed to keep their working forces intact by shifting men and women from one division to another. The layoffs, where necessary, have been of short duration so that the workers could not obtain releases and go to other fields.

Steel City Rations Manpower; Rates Scored; Capacity Upped

PITTSBURGH—Scraping the bottom of the labor barrel, the Pittsburgh district this month started rationing manpower in order to prevent institution of the compulsory 48-hour work week, which would keep new war contracts out of the area.

Under the worker-rationing program supervised by the War Manpower Commission, new workers will be hired on a priority basis, with employers grouped into three classes.

Group A, those handling Army, Navy or Maritime Commission contracts, will be permitted to hire workers for replacement and expansion within employment ceilings set up by a Manpower Priorities Committee. Group B, all other employers whose activities are designated essential or locally needed, will be permitted new workers for replacement only, and only within a fixed limit. Group C, remaining employers in non-essential fields, will be permitted to hire only those workers who can't be utilized by Group A or B establishments.

The drastic labor controls were established so the district can meet the need for approximately 30,000 workers in the next four months if production schedules are to be fulfilled.

Needs Rate Adjustment

A blunt warning that unfavorable freight rates must be reduced if Pittsburgh is to maintain its place as a steel center has been sounded by Benjamin F. Fairless, president of the United States Steel Corp. Forty years ago, Pittsburgh was at an average freight disadvantage of only a dollar per net ton on shipments of steel to New York, as compared with similar shipments by eastern competitive mills located nearer to New York, Fairless claimed; today, that freight disadvantage averages $3.80 per ton.

Concerning the question of postwar disposal of government-owned steel plants constructed for war production, Fairless advocated that the government should treat these plants as part of the war cost of the same general character as that of a battleship or destroyer, and should not attempt to recover the full cost of these plants if they are sold or leased to private industry.

Placed in operation this month was the final unit of the Monongahela Valley project, largest wartime addition to the steel producing capacity of the country. Built by Carnegie-Illinois Steel Corp. for the Defense Plant Corp., the units are situated at three Pittsburgh district plants of Carnegie-Illinois—the Edgar Thomson Works, the Duquesne Works and the Homestead Works.

Aluminum for Civilians

The first aluminum diverted to civilian use is being made into collapsible tubes for tooth paste and a variety of other products.

An Alcoa subsidiary, the Aluminum Cooking Utensil Co., whose New Kensington, Pa. plant now is devoted to war production, has asked permission of the War Production Board to make a limited line of cooking utensils for civilian use, but the company is not too hopeful of an early resumption of aluminumware production because of the reluctance of government officials to shift to civilian production until a victory over Germany is nearer.

Meanwhile, as aluminum production has exceeded war needs, the WPB has closed 15 aluminum production lines, all in the South and East where power for aluminum production is generated with coal. The curtailment means a nation-wide drop in production of about 15 percent.

Super Speeder—This Westinghouse-designed motor, capable of 60,000 r.p.m., is used for grinding, polishing and routing metals in machine tool work. Formerly, the high speeds necessary were obtained through use of belts and pulleys. The new motor is induction type and is supplied with power from a 1,000 cycle generator

Honor Stevens President

HOBOKEN, N. J.—Dr. Harvey Nathaniel Davis, president, Stevens Institute of Technology and director Office of Production Research and Development, War Production Board, has been elected an honorary member of the Institution of Mechanical Engineers in England. He recently returned from England where he went on a war mission for the OPRD and the Combined Production Resources Board.

Dr. Davis is the fourth citizen of the United States to be so honored. The other three are Henry Ford, Professor A. G. Christie and Orville Wright.

Wartime Washington

Army Service Forces plan schools for contract termination officials. Cutting tool disposal operation may indicate pattern. Improved supply indicates return of competitive shipbuilding bids. Services balk reconversion. WMC asks trade group aid

Train for Termination

Classroom courses in contract termination will be given in production centers when the Army Service Forces completes plans it has been developing for months. Already the Chicago, Detroit and New York ordnance districts are giving such courses, and the movement has proven extremely popular with firms whose officials would like to get their instructions direct. It is expected that, while current courses have been conducted by Army personnel for contractors' representatives, future emphasis will be on educating trade organization and chamber of commerce personnel, so that they can take over the direct job of educating manufacturers.

All local plans are subject to higher authority. When the Army Service Forces Readjustment Division Training Branch brings out the course it has in preparation, this may become the nationwide standard, supplanting all locally developed courses.

AAF to Sell Cutting Tools

Government agencies are eyeing with interest the recently implemented Army Air Forces plan to dispose of surplus materials by establishing a Cutting Tools Disposal Warehouse in Chicago. Set up after conferences with distributors and salesmen of tool manufacturers, and the creation of an industry advisory committee, the warehouse functions much like a well-organized mill supply house. Distributors and manufacturers will assist in making up complete sets of catalogs on cutting and threading tools of all types. They will help establish an adequate inventory record and control system.

Instead of regarding the development as an intrusion on their territory and a source of unfair competition, Chicago distributors are taking the longer view that the warehouse plan was essential, and that, because they have been consulted in setting it up, the bad features have been reduced to a minimum.

How the Plan Operates

Materials will first be offered to other branches of the government and the armed forces. Then the listings will be made known to 409 prime contractors working on AAF contracts. Failing to find takers in these two groups, the tools may be sold to industrial plants, or to industrial distributors for resale to industry.

Competitive Bids to Return

The nation's shipbuilding industry will be placed on a competitive bid basis this year, opines Rear Admiral Howard L. Vickery, vice chairman of the Maritime Commission. This, in keeping with news that our shipyard output is exceeding our rate of losses may be assumed to mean that we are now producing bottoms at a sufficiently comfortable rate to care for our current needs, as well as to float forthcoming invasions.

Services Balk Reconversion

The War Production Board's reconversion activities have wilted as a result of its accession to the military's demand that they be held in abeyance until after the invasion of Europe. Long-term reconversion programming and immediate stimulation of certain essential civilian lines, popularly called reconversion, have come to a standstill.

Programs for producing a limited number of washing machines and refrigerators for essential civilian use were ready for presentation to the Requirements Committee. But presentation now would merely bring an automatic refusal.

Trade Groups Asked to Aid

The War Manpower Commission, in its campaign to improve labor utilization, is asking trade associations to report principal manpower problems of their industries and what has been done individually to solve them. Effective measures will be passed along by the associations to members and nonmembers, and also to WMC for possible application in other industries.

SWPC Plans Its Own Conversion

Though originally constituted as a war agency, Smaller War Plants Corp. is swinging into its own conversion program, and concerning itself with piloting the little producer through the postwar shoals.

Sundry proposals to protect the little producer—first to be cut off from the war program—are nebulous and unlikely to come about. A pending bill would give SWPC funds and authority to lend money to small business to buy postwar surpluses. SWPC is also being promoted as the medium for tiding small war plants over the financial hump between cancellation and final contract settlement.

Some interests would like to see SWPC converted, after the war, into a permanent small business agency with the money and backing to provide the little fellow with venture capital in long-term loans at reasonable rates, and technical and managerial advice.

Will Speed Information

To assure speedy utilization of materials and manpower made available by contract terminations and procurement program adjustments, WPB has established an information-distributing system designed to speed the facts to appropriate government agencies.

Chiller—The M-12 panoramic telescope for aiming guns is brought to high-altitude temperature in the Eastman Kodak Company's arctic chamber. Thermocouple wires, which lead from the telescope to a testing instrument, measure the below-zero temperature. Other Kodak-produced instruments, such as the aerial camera used at 40,000, or more, feet, are tested

Army Drops Steel Shell Cases Because of Easier Copper Supply

WASHINGTON—Despite reports of excellent service records, especially in the South Pacific, steel cartridge and shell cases (except for .45 cal. pistol ammunition) have been abandoned by Army Ordnance. On the other hand, Navy will continue to use steel for a certain anti-aircraft round, and hopes to bring another into mass production.

Army's reversion to brass for cartridge cases and shell cases springs from the easier supply of copper, and the ease with which brass is fabricated. In the new supply program, small-arms ammunition has been cut back drastically because reserve stocks here and abroad are adequate and new output need equal only consumption in combat and training. This circumstance alone frees considerable brass. On the other hand certain types of artillery shell cases are required in a hurry by changing conditions in war theaters, and these can be fabricated more quickly and with less scrap from brass than steel. Considerable expansion has taken place in brass-manufacturing facilities, especially in the Midwest. And during the war period the cost of brass cases has dropped 50 percent or more.

In an over-all view of the matter, Ordnance takes the position that steel is not as satisfactory as brass for artillery cases. Presumably this opinion arises from manufacturing problems. For the steel case, made by the millions, has given a very good account of itself in combat. And experienced officers conclude that steel shell cases are entirely satisfactory from every technical standpoint.

Research May Continue

Although procurement of steel shell cases is apparently a dead issue for the balance of this war, the equipment will be converted to brass. Research upon steel cases will likely continue under Army auspices. For the brass case, satisfactory as it is in present-day guns, has reached the limit of its possibilities, whereas the steel case has not. Much has been learned during the past 15 months about plastic flow of steel, and reductions in the order of 60-70 percent have been achieved whereas it was once thought that 40 percent was the limit. And the physical properties of steel shell cases can be raised by either of two methods. First, by adding some alloying material the tensile strength may be raised several thousand pounds above the present figure of 130,000-135,000 lb. per sq. in. Second, by adding alloy and heat-treating, the case properties may be raised to 200,000 lb. per sq. in. What this will mean in the design of future artillery is unpredictable, but it should be of extreme importance. There has been talk of awarding a steel-case contract to a certain firm with an eye toward these developments, but that idea may also be shelved.

See Peacetime Adaptation

Regardless of future military uses, the steel shell case has taught industry lessons that forward-looking men are planning to use in postwar products. Several kitchen-utensil manufacturers expect to use the principles developed—for example, to secure a cheaply processed pan that will have the advantage of a thick bottom and thin side, previously attainable only by casting. Others are thinking in terms of automotive parts with a thick bottom or end and a thin, deep-drawn wall. The cold-forming process developed for steel shell cases will lend itself admirably to such items and the cost, both for press work and tooling, will be very low per piece.

Issue Cancellation Guide

WASHINGTON—An Army-prepared manual will tell contractors, step by step, what to do about termination of contracts, both before and after notice of cancellation arrives.

The new handbook is designed to give contractors a simply worded guide, written from their own point of view instead of from that of the contracting officers. In addition to a summary of orders and instructions it will contain a good deal of general advice designed to speed up settlements and forestall misunderstandings.

One of the main points of the manual is that the more a contractor does to prepare for termination before it actually occurs, the more quickly he will get his settlement.

The Readjustment Division of the Army Service Forces has put together an outline of the points that the manual should cover and is circulating it among trade associations and procurement officers. The final product probably will reach contractors about March 1.

McNutt Boards the Labor Draft Bandwagon; Evaluates Manpower

WASHINGTON — War Manpower Commission Chairman Paul V. McNutt reversed his opposition to a national service act with the assertion, "who are we to object," when those in charge of high strategy decide it is necessary. "Therefore I support it," he said.

But he added that to get his unqualified support, a national service program would have to include the six basic principles he had set forth in his Louisville speech, Jan. 13. These included emphasis on the local character of manpower problems and continued cooperation between management and labor which has been an integral part of all successful voluntary community manpower programs.

To Reclassify Chicago

Speaking at a news conference, of the manpower crisis in Chicago as threatening a "serious blow to the war program," Chairman McNutt expressed the conviction that the city should be made a critical labor area on March 1 unless substantial additions are made to the labor force. He said the community efforts there to overcome the shortage could be as successful as they have been elsewhere.

He also announced that manpower requirements by July 1 for civilian and military activities would be increased by 900,000 over January 1, apart from a 3,400,000 seasonal increase in agricultural employment.

To provide a net increase of 800,000 in the armed services he indicated that 1,400,000 will have to be inducted in order to compensate for those who are discharged or lost.

Lists Manpower Needs

He detailed the five manpower problems which the nation faces in the immediate future:

1. Although war production as a whole has leveled off and total munitions employment has reached a plateau, many specific production programs—aircraft, ship repair, radio and radar, heavy trucks, landing craft—still are expanding.

2. The replacement of personnel in industry due to military withdrawals will become increasingly difficult.

3. Workers must remain in essential jobs in the face of growing attractions to seek more permanent employment in work of a non-war character.

4. The seasonal labor demands of agriculture will be for about 3,400,000 during the first six months of the year and must be filled. The services of women and students who work on farms only during the peak season will again be needed.

5. Highly critical industries such as railroad and other transportation, ball bearings, foundries, coal, meat-packing and electronics currently face serious labor shortages.

Spotting The Air News

The argument over the comparative advantages of landplanes and flying boats continues, with many good points offered by proponents of each. Designers seek means of eliminating landing gears. Improved designs help operators

Flying Boats vs Landplanes: As plans develop for the establishment of global airlines, the old controversy over the relative efficiency of land and water planes is renewed. The flying boat uses its fuselage as a boat on which to take off, land, and sit in the water, but the landplane must add to its fuselage wheels and retraction gear with which to operate on the ground. Up to large sizes, say 150,000 pounds, the landplane has the advantage, because it can be better streamlined. The flying boat's necessary hydrostatic lines are not good aerodynamic lines. It must have wing-floats or seawings and it must have reinforcement in its bottom to take the shock of landing and of rough water. Everybody agrees on that much.

But they disagree when big planes are considered. Arbitrarily, post-war big planes will begin at about the size of the 140,000-pound Mars and the Army's lone B-19 of the same weight. As landplanes get big, their landing gear begins to weigh a high percentage of gross. This figure runs from 6½ percent in the 15,000-pound gross weight class to 11 percent in the 150,000-pound class. An equivalent weight of fuel or cargo must be displaced. Thus the Mars and the B-19 both gross about 140,000 pounds, but the Mars empty weights 70,684 pounds against the B-19's 84,330. The difference is 13,846 pounds cargo or fuel advantage for the Mars. The advantage for boats goes up as the planes get bigger. So say advocates of flying boats.

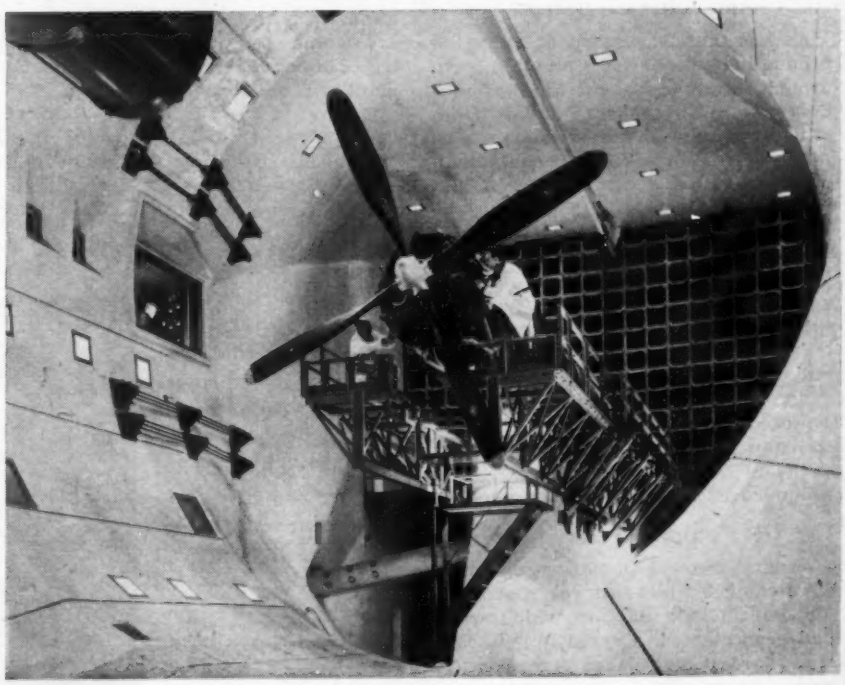
Airports the world around are inadequate for the big landplanes expected. Most of them were designed to take the smaller B-17 Flying Fortress type of bomber. Their runways are not long enough, and their pavement will not hold the landing shocks of really big airliners. Extending these fields, or building new ones, will cost heavily. Seaplane men argue that nearly all major cities have adequate water landing areas nearer their centers than airports can be located, that they are mostly in the temperate zone and free from surface ice. Landplane men answer that docking or lightering flying boats is very slow, and that most goods, not being destined to a place on the water's edge, must be hauled inland.

No doubt the dispute will be settled by trial and error, in the air. Meanwhile, development of water planes has fallen behind that of landplanes. England is good at the design and operation of flying boats, and many Americans think the United States should spruce up in that line.

Neither land nor sea type will be adopted to the complete exclusion of the other. It is possible that land planes may some day get rid of their landing gear. Nothing hurts an airline operator's feelings worse than hauling tons of undercarriage ten hours a day and using it ten minutes. Engineers are already seeking means to belly-land big planes on lubricated skidways or ground carriages. The problem of forced landings away from such facilities grows less and less with increasing reliability of engines, used four and six to a plane. One of the big hurdles in doing away with landing gear is the propellers which extend far below the ship's underside.

Backtalk is plentiful from the landplane fans. They ask—Who wants such big airplanes anyway? No less than Dr. E. P. Warner, vice chairman of the Civil Aeronautics Board, believes that 50-passenger planes, making frequent departures, will be desirable, especially on the Atlantic. Landplane men contend that even if big planes are wanted, the extra beefing up that must go into the bottom of the big flying boat to make it seaworthy weighs more than the landing gear. The seaplane men reply that reinforcement in landplane wings to hold up the wheels and gear will weigh more than the boat bottom beefing. And furthermore, competition will force economy, and small planes will be run out of the picture.

Increasing efficiency in aircraft design is helping the operators, but the manufacturers are working themselves out of a job. Every time they add more speed, more range, or more net lifting capacity they cut down the number of units the operator needs. Every time they improve the plane for service and maintenance, they add more hours per day it can be in use. For instance, the DC 3, used on most airlines, makes the coast-to-coast run in 16 hr. with passengers and cargo.



Test Tube—Two propeller and engine experts work in one of the two new, giant soundproof propeller test cells built by Curtiss-Wright Corp., Caldwell, N. J., for testing warplane propellers up to 30 ft. in diameter and liquid-cooled and air-cooled engines of 5,000 hp.

Shifting Emphasis Cuts Canada's 1944 War Outlay Quarter Billion

OTTAWA—Canada is cutting its financial appropriation for war spending for the fiscal year starting April 1, by $240,000,000, and the saving will be largely in expenditures on munitions contracts and capital installations. The reduction is from $3,650,000,000 for the current fiscal year to $3,389,000,000. Neither figure includes $1,000,000,00 for mutual aid (Canadian version of lend-lease).

War production in the dominion reached a peak around October-November 1943. Value of completed munitions, construction and capital assistance (exclusive of wartime housing) amount to $3,179,00,000 in the calendar year 1943 (last two months estimated), an increase from $2,452,000,000 for 1942. It brought the total for the war to $7,342,000,000.

Production in 1943 is better shown in units of output and percentage increases over 1942: escort and patrol vessels, 290, up 143.7 percent; cargo ships, 1,032,000 tons, up 1.5 percent; armored vehicles, 16,850, up 34.8 percent; machine guns and small arms, 625,000, up 92.3 percent; army and navy guns, 45,000, up 45.2 percent; heavy ammunition, 28,500,000 rounds, up 1.8 percent; small arms ammunition, 1½ billion rounds, up 25 percent; explosives and chemicals, 500,000 tons, up 16.3 percent.

Allies' Orders Dropped

As less than 30 percent of Canadian production goes to Canada's own armed forces, rate and kind of production are governed by orders from allied nations. These orders have fallen off for some kinds of equipment, partly because accumulated supplies were equal to immediate and foreseeable requirements, changes in design and development of new equipment.

Production cutbacks since the peak was reached last fall which have resulted in contract cancellations or curtailments have mainly been in shipbuilding, shells and explosives, and in guns and small arms and types of armored vehicles and mechanical transport of which stockpiles were sufficient or which were giving place to improved or entirely new models.

Shipyards Busy

A number of shipbuilding contracts were cancelled late last year but these did not include any on which work had been started. Currently new contracts are being placed for about 14 cargo boats. The shipbuilding program as it stands will keep most of the yards busy into 1945. Altogether some 135 merchant ships are on order and on the Pacific coast, instead of the release of shipyard workers anticipated last fall, there is now demand for from 6,000 to 8,000 more men.

Canadian plants turned out 3,600 airplanes last year as against 3,800 in 1942 but as in the United States the shift from trainer to combat planes and bombers involved a substantial increase in productive effort. The plane production program is considered to be satisfactory now after some lag last year. Lancaster bombers are being turned out at the rate of about ten a month and production of Mosquito bombers has been brought up to schedule.

Emphasis for the next few months will be on aircraft, new types of combat weapons and improved designs of weapons now in use, armored vehicles and mechancial transports.

Manpower Eases

The manpower situation in war industry is now pretty well in hand. When several hundred men and women were transferred last month (January) from a government-owned explosives plant at Nobel, Ontario, which is being closed down, munitions plants put in for only a relatively small proportion of them. Altogether over 2,000 workers will be released from Nobel in the next two or three months. The Lancaster bomber plant at Malton, Ontario, can use several hundred if they are suitable but many are going to non-war plants. The big Massey-Harris farm implement plant will absorb many of them.

Easing of metals supplies and release of some plant capacity from war goods operations is resulting in a very limited resumption of production in some consumer goods lines suspended for about two years. Chief items are washing machines and electric irons. The programs for both call for only a few thousand units. One plant will make most of the washing machines and these will be strictly de-frilled. Altogether about 500 consumer goods items have been released from the production ban and manufacturers are free to make them if their plants are not fully occupied on war orders and if they can get raw materials. Actually only a few lines are expected to go back into production during the next six months at least. Manufacturers are expected to effect even distribution of the limited output.

U. S. Takes a Quarter

Canadian war equipment is going to all war theatres. It is unofficially estimated that about 20 or 25 percent of it is taken by the United States.

A good many plants, many of them based on metals, are now working on orders resulting from Canada's billion dollar mutual aid program for the United Nations. Many more will be similarly occupied for some time after their war contracts are completed or terminated as mutual aid is replaced by the relief and rehabilitation program for liberated countries.

TOTAL '43 MUNITIONS OUTPUT

Mechanical Transport	$446,000,000
Cargo and Naval Vessels (including repairs)	423,000,000
Aircraft	341,000,000
Armored Vehicles	225,000,000
Guns and Small Arms	196,000,000
Ammunition and Bombs	195,000,000
Instruments and Signal Equipment	183,000,000
Explosives and Chemicals	152,000,000
Small Arms Ammunition	75,000,000
Miscellaneous Military Stores	540,000,000
Total for Munitions	$2,776,000,000

Tiger Topper — The same day Germany introduced its "Tiger" tanks in battle, Britain started using a 17-lb. gun that can knock out the most heavily armoured enemy tank at 1,000 yards' range. It is more than a match for German 88 mm. guns, and is attributed astonishing accuracy. British Auxiliary Territorial Service girls are greasing the breech of one of the "killers"

Names in the News

Brill Vice President

HOWARD A. FLOGAUS

Bunting Sales Director

ROBERT R. HIRSCH

Howard A. Flogaus, chief engineer of J. G. Brill Co., Philadelphia, has been advanced to vice president in charge of engineering. He joined the Brill company in 1939 as assistant to the vice president, later being made chief engineer of motor coach, trackless trolley and street car design. Mr. Flogaus has been identified with the motor coach industry since 1924 when he was connected with the Skinner Automotive Device Co. of Detroit. In 1930 he joined the engineering staff of Yellow Truck & Coach Mfg. Co., Pontiac. He went to Reo Motor Car Co., Lansing, Mich., in 1937 as chief engineer, later advancing to vice president in charge of engineering and manufacturing.

Robert R. Hirsch has been named director of sales of Bunting Brass & Bronze Co., Toledo, Ohio, succeeding George H. Adams, recently made executive vice president of the company. Mr. Hirsch has been associated with SKF Industries, Inc. for the past 25 years, in recent years as district manager of the Detroit and Cleveland areas.

Fred C. Smith, assistant sales manager of the McKay Co., Pittsburgh and York, Pa., has been promoted to the position of general sales manager of all divisions of products. Mr. Smith began his career with the company in 1927, advancing successively from the positions of statistician, sales correspondent and sales promotion manager.

J. Henry Schroder, vice president of Sunbeam Electric Mfg. Co., Evansville, Ind., has been named general manager, taking over responsibilities relinquished by W. A. Carson, president and treasurer. **Walter V. Stippler** has become vice president in charge of production.

W. C. Stolk has been appointed vice president in charge of sales of American Can Co., New York City, succeeding C. H. Black who was recently named executive vice president. **R. L. Sullivan** has been made vice president in charge of the Atlantic division.

A. M. Wickwire has been made vice president of Automatic Products Corp., Wilmington, Del. At the same time he has become president of Mercury Clutch Corp., Canton, Ohio, a subsidiary company.

John C. Dilworth, manager of the Pittsburgh railroad sales division of United States Steel Corp., has been appointed manager of sales in the railroad materials and commercial forgings division for both the Pittsburgh and Chicago districts. Assisting him as district managers of sales are **Orrin H. Baker** for Pittsburgh and **John J. Davis, Jr.** for Chicago.

W. T. Darcy has become manager of service shop sales at General Electric Co., Schenectady, N. Y. He will supervise and coordinate the repair and renewal parts business-building activities of G.E. service shops all over the country. He retains his duties as manager of renewal parts division, industrial divisions.

Henry J. Hoffman has become sales manager of the power tube division of Machlett Laboratories, Inc., Norwalk, Conn. After being associated with General Electric Co. for two years, Mr. Hoffman joined Westinghouse Electric & Mfg. Co. in 1926. In 1932 he was appointed manager of electronic tube sales, and became general manager of the company's special products division in 1937. Mr. Hoffman is at present chairman of the Electronics Div. of National Electrical Manufacturers Assn.

J. B. Jeffress, Jr., has been advanced from secretary and treasurer of Continental Can Co., New York, N. Y., to a vice president of the company. **W. H. Funderburg** has been placed in full charge of the company's sales.

Cecil P. Young, formerly commanding officer of the Miami air region, has become executive vice president of Wickwire Spencer Aviation Corp., a subsidiary of Wickwire Spencer Steel Co., New York City.

P. V. Moulder has become general manager of the new motor truck division of International Harvester Co., Chicago. The members of his divisional executive staff include **W. D. Reese,** manager of engineering; **V. A. Guebard,** manager of manufacturing; **D. A. Conroy,** manager of supply and inventory; and **W. C. Schumacher,** manager of sales.

Austin J. Brooks has been named plant manager of the propeller division of Curtiss-Wright Corp. at Beaver, Pa. Previous to joining the firm in 1943, Mr. Brooks was connected with Hamilton Standard Propeller Div. of United Aircraft Corp., E. Hartford, Conn.

Adolph Frankel, staff assistant to the manager of the lamp division of Westinghouse Electric & Mfg. Co., Bloomfield, N. J., has been appointed manager of the electronic tube sales department of that division. Mr. Frankel has been associated with Westinghouse since 1917.

J. H. Tice has been named district sales manager for Jones & Laughlin Steel Corp. at Tulsa, Okla. He succeeds R. J. Woods, Jr., who has transferred to Frick-Reid Supply Corp. as district manager of tube sales in the same city.

Ralph L. Wilson, former chief of the constructional steels section of the Metallurgical and Conservation Branch, Steel Div., WPB, Washington, has become chief metallurgical engineer of Timken Roller Bearing Co., Canton, Ohio. For 6 years, Mr. Wilson was connected with the metallurgical departments of United Alloy Steel Corp. and Central Alloy Steel Corp., after which he was for 10 years employed by the Steel & Tube Div. of Timken.

B. M. Staley has joined Kaydon Engineering Corp., Muskegon, Mich., as factory manager. For the past 12 years Mr. Staley has been connected with the rotary pump division of National Transit Pump & Machinery Co. at Oil City, Pa., recently occupying the position of general manager.

Talon Plants Manager

NOEL POUX

Regional Steel Manager

H. N. ARBUTHNOT

Noel Poux, for several years in charge of the plastic research department of Talon, Inc., Meadville, has been appointed manager of the works engineering division of all Talon plants. **C. C. Judd,** formerly manager of the Erie plant, has been promoted to production manager of slide fastener manufacturing at Erie and Meadville. **D. Case** becomes general superintendent in charge of the Erie plant.

H. N. Arbuthnot, assistant general manager of sales of Allegheny Ludlum Steel Corp., Brackenridge, Pa., has been appointed to the newly created position of regional manager of the Detroit territory of the corporation, with headquarters at the plant and sales office in the Ferndale section.

BUSINESS ITEMS

Joseph T. Ryerson & Son, Chicago, is opening a district sales office in Los Angeles. Lee Bergstrom of Bergstrom Steel Co., Ltd. has become manager. A sales office has also been established in the Grant Bldg., 330 Grant St., Pittsburgh, with Howard L. Robinson as representative.

H. K. Porter Co., Pittsburgh, has opened an enlarged New York and export office at 50 Church St., New York City, to serve as an eastern center for the company's line of locomotives, process equipment and pumps. Thomas Mac Lachlan has been named general manager. R. G. Newell, who managed the New York office of Quimby Pump Co. before its acquisition by Porter, is directing activities of the pump division in New England and the New York district, from the new office. Earl M. Bardo is located in this office and represents Porter chemical process equipment for the same territory.

Lincoln Electric Co. of Cleveland has appointed **R. H. Davies** as welding engineering representative in Washington, D. C. He will be located at 410 Hill Bldg.

Satterlee Co., Minneapolis, has been appointed agent for Kent-Owens milling machines in this territory.

Kropp Forge Co., Chicago, has announced the appointment of Charles L. Foley as engineering sales representative for New York and adjacent territories, including eastern Pennsylvania, all of Maryland except Garrett and Allegany counties, Delaware, New Jersey and Connecticut.

Rietze & Co., 1017 E. Broadway, Louisville, Ky., have been named sales representatives for Allen-Bradley line of electric controlling apparatus. They will handle the southern Indiana and western Kentucky territories.

Crown Can Co., Philadelphia, has announced the removal of its Madison, Wis., plant to Chicago shortly. It will occupy premises at 3501 W. 31 St.

Divco-Twin Truck Co., Detroit, has announced a change in the company name to Divco Corp.

OBITUARIES

Frederick J. Macwilliams, 49, general manager of Abart Gear & Machine Co., Chicago, died following an extended illness. He was one of the founders of the company in 1931.

Walter H. Hallsteen, 53, vice president and treasurer of Ilg Electric Ventilating Co., Chicago, passed away in Evanston, Ill. Mr. Hallsteen joined the sales staff of the organization in 1916.

Allen N. Bradford, 47, general manager of Russell, Burdsall & Ward Bolt & Nut Co. Rock Falls, Ill. plant, died following a short illness.

Edward J. Frost, 74, retired president of Frost Gear & Forge Co., Jackson, Mich., died in that city recently.

Mason P. Rumney, 60, vice president of Detroit Steel Products Co., Detroit, died in Rochester, Minn. He had been connected with the company for 35 years.

Maxwell R. Berry, president and treasurer of Electric Products Co., Cleveland, died in Florida after a brief illness. He organized the firm 32 years ago.

John Storm, 43, New York district sales manager of Carborundum Co., Niagara Falls, N. Y., died in Englewood, N. J.

Joseph Zwolanek, sales manager of the motor department of Barber-Colman Co., Rockford, Ill., passed away suddenly.

Fred McCarty, 62, president of the Champlain Corp., Garfield, N. J., and former president of R. Hoe & Co., New York City, died at his home in Orange, N. J.

Frank E. Manning, plant superintendent at Elizabeth, N. J., for Linde Air Products Co. passed away at the age of 45.

O. J. Beaudette, manufacturer of auto bodies, died at the age of 80. In 1892 he established the O. J. Beaudette Co., and built auto bodies for the Ford Motor Co.

MEETINGS

American Foundrymen's Assn. War production congress and show. Memorial Auditorium, Buffalo, N. Y. Apr. 25-28.

American Gas Assn. War conference. Hotel Seneca, Rochester, N. Y., Mar. 30-31.

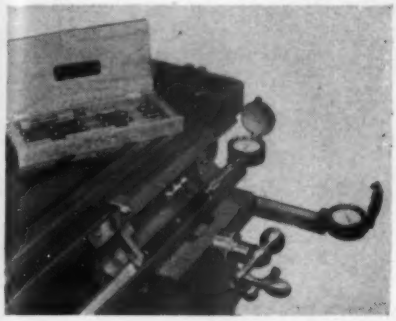
American Society of Mechanical Engineers. Spring meeting. The Tutwiler, Birmingham, Ala. Apr. 3-5.

American Society for Testing Materials. Spring meeting. Netherland Plaza, Cincinnati, O. Feb. 28-Mar. 3.

American Society of Tool Engineers. Annual meeting. Bellevue Stratford Hotel, Philadelphia, Pa. Mar. 26-28.

National Electrical Manufacturers Assn. Spring meeting. Palmer House, Chicago, Ill. Apr. 24-27.

Shop Equipment News



Index indicator, micrometer head, and rod

Index Machine Designs Rods And Indicators for Its Mills

Index Machine & Tool Co. has designed measuring rods, indicators and micrometer heads for installation on the latest model Index mills. The equipment is distributed through Blank & Buxton Machinery Co., 3100 East Michigan Ave., Jackson, Mich.

This equipment will locate and bore holes in an area 8×16 in. The indicators are graduated in 0.0001 in. and graduations are spaced to provide ease in locating the holes.

Aeroil Makes Twin Waxmaster And Waxmaster Senior Tanks

The Twin Waxmaster hot wax dip tank has been produced by Aeroil Burner Co., Park Ave. at 57 St., West New York, N. J. This portable, electrically heated unit features two compartments. The first one may be used for melting wax for spraying. Thermostats are provided in each insulated compartment, permitting temperature control from 100 to 550 F.

The company has also made a larger adaptation of its portable, electrically heated Junior model hot wax dip tank which is called the Waxmaster Senior. The tank in this model has a dipping space of 25 × 25 × 9¾ in., and is said to be capable of melting up to 24 lb. of solid wax in 50 min.

Both models are equipped with dip baskets, heavy-duty grills, built-in thermometers and thermostats. They are mounted on casters and operate on 110 or 220 volts.

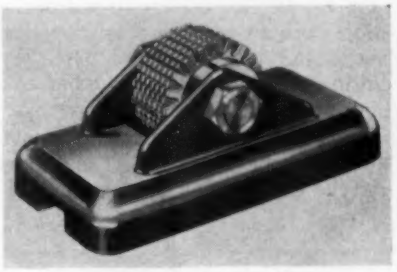
Baker Multiple-Spindle Automatic Cycle Boring Machine Built to Handle Magnesium Covers for Airplane Engines

Baker Brothers, Toledo, Ohio, recently developed a fully automatic cycled multiple-spindle multiple-operation, horizontal hydraultic feed, boring machine. Designed for high production, the machine is also said to give extreme accuracy of limits between bores.

This special machine for use in the aircraft industry was made to handle the magnesium cover for airplane engines where bores and counterbores are held to accurate limits on diameter and must be spaced in relation to each other at a very close limit of center distance.

The unit multiple head carries 15 spindles with a group of eight spindles at the front first cutting station. These spindles are used for drilling from solid several of the holes and rough boring the center large bore of the part. Seven spindles are provided at the rear second station for finish boring and finish counterboring.

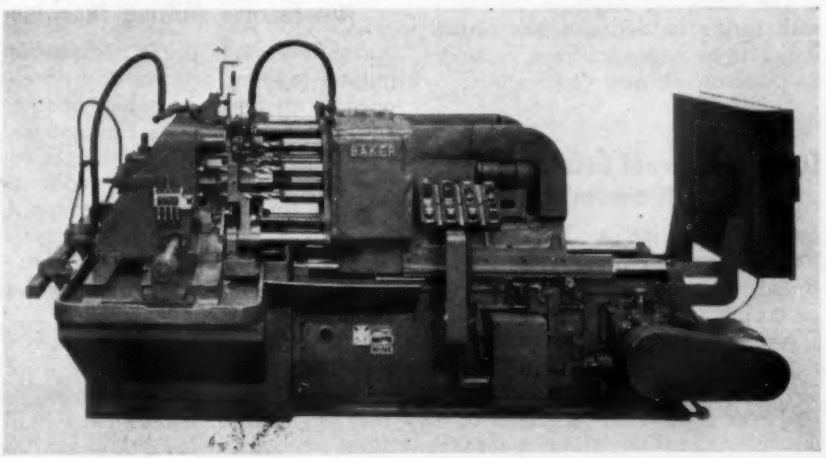
To allow for easy chucking of the part, the work holding fixture with support bushings is mounted to the front. After the operator pushes the button the work holding fixture moves to the first front cutting station, and when it is in position and accurately located, the multiple spindle head unit moves forward and performs the drilling operations. Following the first operation, the head returns to the back position where the second operation is performed. After this operation the unit returns automatically, and the fixture and work move to the original chucking position.



Hanchett wheel dresser

Hanchett Offers Two Types of Dressers for Grinding Wheels

Two types of wheel dressers, one for table mounting on surface grinders and the other for hand use are now available from Hanchett Manufacturing Co., Big Rapids, Mich. The table type dresser can be held or clamped on the reciprocating table in cases where a built-in dresser is not adaptable. It has two types of serrated cutters of special steel, hardened and ground to size. The cutter assembly



Baker multiple-spindle multiple-operation boring machine

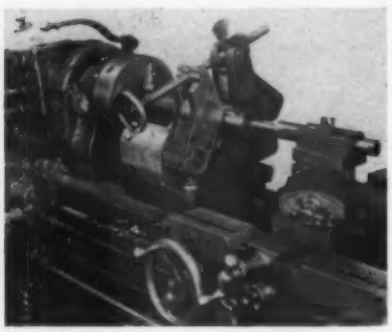
has a steel barrel which revolves on a hardened spindle. The cutters are mounted off-center so that cutter lands are staggered when assembled on the barrel with alternate cutters reversed. Cutters for both fine and coarse finish are designed to prevent abrasive metal from clogging lands and impairing efficiency.

The hand model dresser for general use is intended for hard to get at points of application. It incorporates the same features as the table model, but has a special grip handle.

Stecher Steadyrest for Lathe Handles Second Operation Work

A heavy-duty self centering steadyrest is offered by Charles Stecher Co., 2452 North Greenview Ave., Chicago 14, Ill., for use on second operation work on such parts as propeller shafts and other airplane parts requiring end machining on either engine or turret lathes.

This hand-operated model mounts directly on the ways of a 22 in. lathe, and has capacity of from 1½ to 9 in.



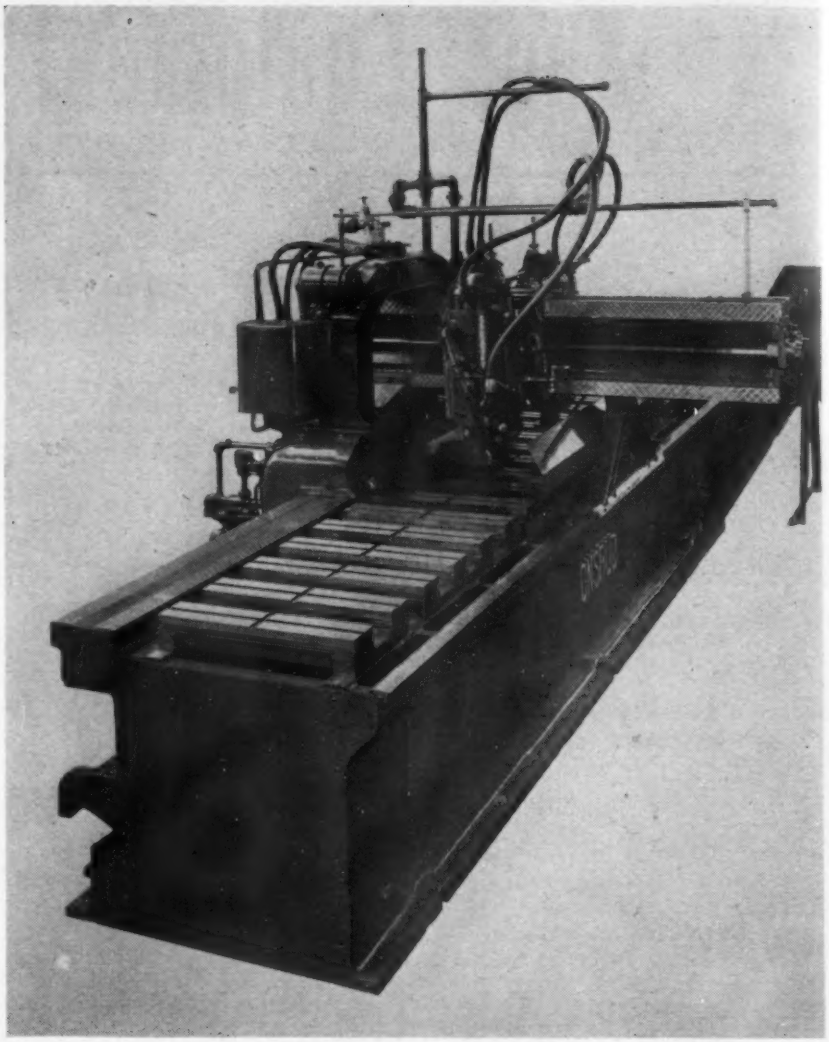
Stecher self-centering steadyrest

An air-operated model is designed with a bracket for mounting on the back of a heavy-duty turret lathe to allow clearance for the side turret.

The clamping screw is provided with spring tension and has a dial indicator to insure uniform pressure on pieces which may vary slightly.

Superior Internal Grinder Requires Minimum Floor Space

Superior Machine & Tool Works, 524 Butterworth St. S. W., Grand Rapids, Mich., has built the J-Y precision internal grinder. It has a table travel of 10 in. and cross travel of 3 in. This machine will grind from ¼ in. up. Four speeds are provided, and the drive shaft is driven by a ¼ hp. motor. The grinding spindle is driven by a ½ hp. motor, 3,450 r.p.m. Overall dimensions of this grinder are 29×26×58 in. high. Height to the center of the spindle is 45 in. It is equipped with a 10-in. faceplate.



Onsrud non-ferrous milling machine

Onsrud Develop High Speed Non-ferrous Milling Machine

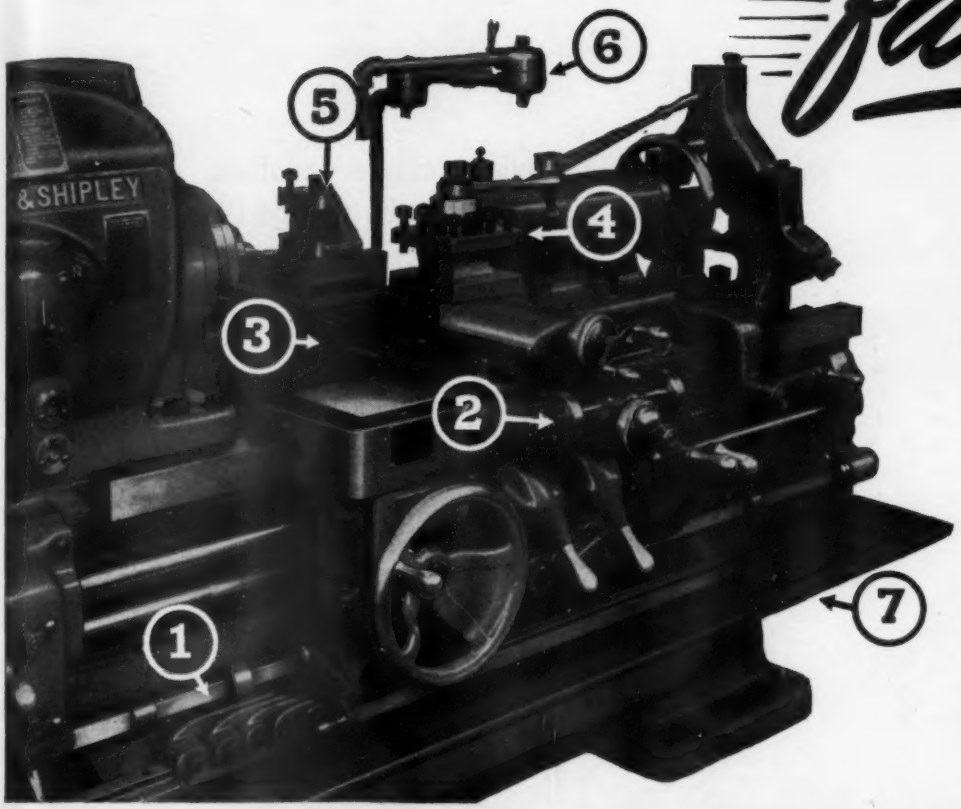
A special high-speed non-ferrous milling machine was recently developed by the Onsrud Machine Works, Inc., 3921 Palmer St., Chicago 47, Ill., for milling long flat bevels on aircraft wing and fuselage stock so that skin sheet sections may be lapped to form a smooth surface. Bevels with surface widths up to 8 in. may be machined to a mirror finish in a single pass.

The machine consists of a long bed and T-slot table on which the work is held and a carriage which travels over the bed to move the cutter head along the work. The bridge arm of the carriage holds two cutter heads, each of which may be tilted to 15 deg. off perpendicular, in a vertical plane parallel to a vertical plane running lengthwise with the bridge arm.

For a constant or straight line bevel, work is set up on the table parallel to the direction of table travel, the bridge arm is positioned to form a 90 deg. angle with the bed and travel. Cutter heads are set at the angle required to make the bevel and both heads may be used in one pass if necessary. End mill or fly cutter types of tools may be used with a maximum recommended working diameter of 8 in. Cutters are driven directly at 3,600 r.p.m. by 15 hp. motors.

To bevel on a taper or crosswise edge, the work is milled by moving the cutter head in a vertical or untilted position across the bridge arm screw. Work is held in a fixture in a tilted plane to the angle of the bevel required. Bevels of this type can be only as long as motor travel across the bridge arm permits.

Produce SMALL Lots *faster*



LATHES GOOD LATHES ONLY
SINCE 1892

Original Navy "E"
Awarded March 6, 1942

Why you save time with The Lodge & Shipley Manufacturing Lathe

Change over quickly and easily from one job to another.
Advantageous use of multiple tools and universal holders.
Transfer of diameter and length control from operator to lathe.

OUTSTANDING FEATURES

(1) Multiple Length stops (Telescopic Dog Type), automatically disengage longitudinal feeds.

(2) Multiple Diameter Stops, for both front and rear tools, can be quickly indexed for establishing diameters. Time wasting "cut and try" eliminated.

(3) Connected rear rest increases tooling possibilities. Adaptable to single or multiple tools.

(4) Four-way tool block on compound rest can be indexed for twelve equally spaced tool positions.

(5) High duty tool block in rear used for single tool can be supplemented or replaced with multiple holder.

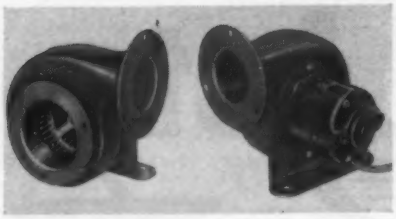
(6) Coolant pump and piping.

(7) Chip pan.

WRITE FOR PUBLICATION No. 482

THE LODGE & SHIPLEY MACHINE TOOL CO.
CINCINNATI, OHIO, U.S.A.

ENGINE TOOL ROOM AUTOMATIC OIL COUNTRY LATHES



Ilg utility blower

Ilg No. 6S Utility Blower Made in Variety of Mountings

The No. 6S utility blower with flexible mounting arrangements has been designed by Ilg Electric Ventilating Co., 2850 North Crawford Ave., Chicago 41, Ill. Eight different arrangements are available, which include blower only; blower and stand; blower and inlet flange; blower and discharge flange; blower, inlet and discharge flange; blower, stand and inlet flange; blower, stand and discharge stand; or blower, stand, inlet and discharge flanges. It operates by a series wound, 110 volt, single phase, 60 cycle, a.c. motor at 3,400 r.p.m Wheel and motor are direct-connected.

N. & W. Combination Machine For Knurling and Marking Parts

A combination high-speed marking and knurling machine is being marketed by Noble & Westbrook Manuacturing Co., 20 Westbrook St., East Hartford, Conn. This machine is designed to impress knurling, company name, part number and other identification into socket wrench and similar parts. All ot this is done with a single feeding.

Pieces are loaded on a carrier dial, which revolves, and are taken to the point where they are knurled, marked and automatically unloaded. Knurling on one or two bands is done in the first position, after which the identification is marked. The knurling die-holder has a compensating spring device which takes care of slight variations in work diameter. Flat marking dies are set in a dovetail shank which allows for vertical adjustment. Here pneumatic die pressure is used; this can be adjusted from 10 to 100 lb. Pressure required depends upon size of mark, depth of inscription and hardness of material.

The pressure dial has vertical adjustment so that marking can be brought close to the edge of the piece or at any distance from it up to about 1 in. By using additional dials, the machine will accommodate work pieces up to about 4 in. in diameter.

N. & W. marking and knurling machine

Shields Boring Mill Provides Infinite Variations Of Speeds, Feeds; Permits Change During Operation

Shields boring mill

Infinite variations of all speeds and feeds at all times is provided on the Shields boring mill manufactured by the Shields Manufacturing Company, Inc., 38-09 24th Street, Long Island City, N. Y. With this feature, the operator can adjust the spindle speed on a large facing head operation to compensate for changing cutter diameters—without stopping the cut. Likewise, feed can be reduced or speeded as required for varying conditions.

Speeds and feeds are changed through a push-button control located on a movable pendant. Manual adjustment is also provided. Three direct reading dials show the speeds. The variety of control is provided through three variable speed drives,

Taylor and White's great discovery which made possible high speed cutting was the greatest single development to help make mass production possible. The steel developed, commonly known as 18-4-1, served industry faithfully for over thirty years without a serious competitor.

In the early 1930's the first molybdenum high speed steels were used on a substantial commercial basis and, before the Second World War, about 25% of all tungsten high speed steels had already been replaced by molybdenum high speed steels on merit. This steady progress of logical replacement of the tungsten steels was interrupted by the war because of the tungsten shortage, when many industrial plants were forced to a sudden change to molybdenum steels.

Because of the stress of war production many concerns have never had an opportunity to satisfy themselves thoroughly as to the comparative merits of the molybdenum high speed steels. For those, in this category, who are inclined to return to the tungsten steels, we suggest a serious consideration of the following facts—molybdenum high speed steels perform as well as, or better than, tungsten steels—and they cost less.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company

500 Fifth Avenue • New York City

MOLY

one for the spindle speeds, a second for spindle feeds and the third for all other feeds.

All feed and rapid traverse control is directional and all control levers are provided with slotted portions to make it impossible to engage a hand crank and apply the specific feed or rapid traverse at the same time.

Bar diameter is 6 in., and feed is 60 in., in two steps. Head, table and saddle feeds are 72, 72 and 60 in., respectively. The working surface of the table is 48×48 in.

General Lever Type Speedichuk Increases Lathe Collet Capacity

The lever type Speedichuk produced by General Die-Stamping Tool Co., 265 Canal St., New York, N. Y., increases the collet capacity of ½ lathes to ¾ in. and allows the work to be chucked, fed, machined and released without stopping the lathe. It is suited for the woman operator because it responds to a slight pressure and is easily locked and unlocked.

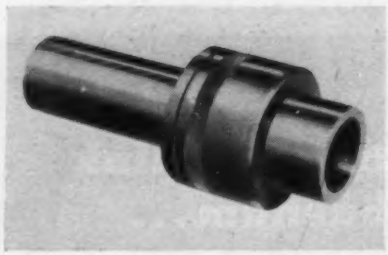
This collet attachment fits light-duty lathes with a No. 3 Morse taper on the inside, and requires no drilling or tapping. The floating closing

Lever type Speedichuk

sleeve compensates for any misalignment of the lathe spindle, and it is said that the hardened rollers reduce friction to a minimum.

Empire Floating Toolholder Available in Two Body Sizes

A floating toolholder is being manufactured by Empire Tool Co., 8774 Grinnell Ave., Detroit 13, Mich. It is available in two sizes of body. The 2½ in. body can be obtained with ½, ¾ or 1 in. holes in choice of 1, 1¼ or 1½ in. diameter shanks. The 3 in. body is made in 1, 1¼ and 1½



Empire floating toolholder

in. holes with a choice of 1¼ and 1½, 1¾, 2 and 2¼ in. diameter shanks.

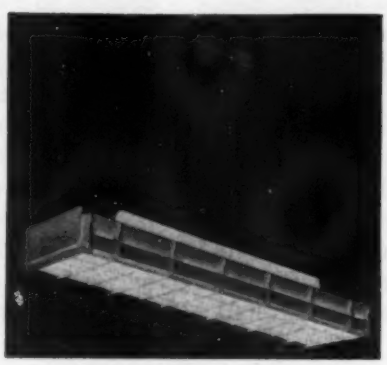
This tool consists of five component parts, the moving parts riding on rollers so placed to as to affect self adjustment of the float.

Curtis Warrior Luminaire Available in Two Mountings

The Warrior luminaire is being offered by Curtis Lighting, Inc., 6135 West 65 St., Chicago 38, Ill. The unit holds four 40 watt fluorescent lamps of 48 in. length, and is suited for ceiling mounting or as pendants. The ceiling mounting luminaire may be used also in a continuous line.

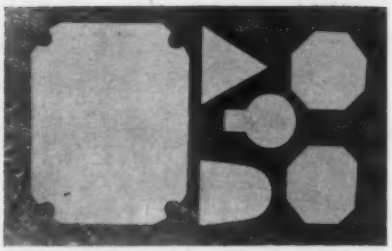
The pendant unit measures 48¾ ×14 in., and the suspension from the ceiling to the bottom of the unit is 8¼ in. overall. Shielding angle of the louvre is 45 deg. crosswise and 30 deg. lengthwise. All types are wired with 110-120 volt, 60 cycle, tulamp ballasts, lamholders, starter sockets and FS-4 starters.

By releasing two spring catches on either side of the fixture, the louvre



Curtis Warrior luminaire

assembly is swung down and hangs on the two remaining spring catches, permitting cleaning and lamp replacement. Louvre assembly, ballast shields and the reflector are made of non-metallic Fluratex finished in glossy white Fluracite.



Avery Kum-Kleen stickers

Avery Kum-Kleen Stickers Are Cut to Specified Shape

Avery Adhesives, 451 East Third St., Los Angeles 13, Calif., has developed a method of making masking stickers cut to the size and shape specified by user manufacturers. Kum-Kleen stickers are applied without moistening and peel off without scraping or tearing. It is said that these precut masking stickers eliminate the necessity of having the operator cut the masks by hand.

Mossberg torque wrench

Apco Mossberg Torque Wrench For Light Assembly Products

A torque wrench for work on light assemblies and delicate products requiring low torque readings has been produced by Apco Mossberg Co., 108 Lamb St., Attleboro, Mass. The wrench is available in four sizes, to measure tension in ranges of 0 to 100 in.-oz, 0-30, 0-50 or 0-100 in.-lb.

This tool measures torque by the spread between two of several bars in the shank, giving a direct reading on a brass scale near the handle. The wrench fits standard socket and can be furnished in any square drive required. It has an aluminum handle, and weighs 6 oz.

Peerless Metal Cutting Saw Features Several Improvements

An improved metal cutting power saw has been produced by Peerless Machine Co., Racine, Wis. A new hydraulic unit has been incorporated in this machine. It is available in a variety of models and sizes. The 7 and 11 in. automatic models can be converted in the shop for handling a single bar or nest of bars or tubes.

The hydraulic micro-set length

New
Webber
Angle Gage Blocks

INDUSTRY KNOWS A GOOD THING

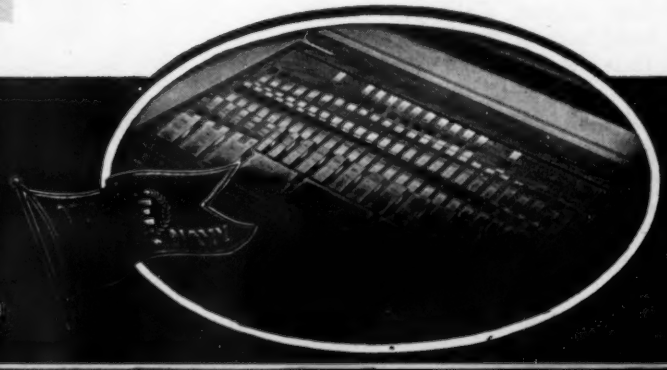
● A few short weeks ago WEBBER announced to American Industry its latest and greatest contribution to the progress of precision measurement, WEBBER ANGLE GAGE BLOCKS.

As though it had been eagerly awaiting such an announcement industry has overwhelmingly and gratefully accepted W. A. G. B. as the Fastest . . . Easiest . . . Surest method of precision angle measurement.

Buyers and users have taken the *initiative* in developing uses, applications, techniques for this amazing new tool. Enthusiasm over its significance and value as a precision measuring tool is very high, and mounting daily.

W. A. G. B. are furnished in sets consisting of 14 blocks which produce 370,800 angles accurate to within ¼ second of an arc. Angle measurement with these blocks is simple—fast and ultra-accurate. Complete information is contained in a new booklet. Write for your copy today.

Yes—American Industry knows a good thing when they see it . . . and in WEBBER ANGLE GAGE BLOCKS they definitely see a good thing.

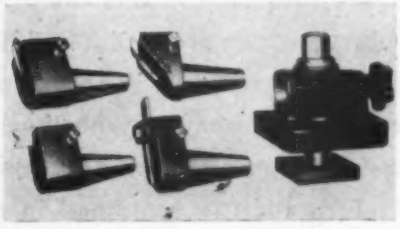


Webber
GAGE COMPANY
12901 TRISKETT RD., CLEVELAND 11, OHIO

Peerless metal cutting saw

gage is mounted on the conveyor for accurately gaging the length of cut. Feed pressure is adjusted by vernier finger-tip screw control. This machine features a four-sided saw frame and backing plate blade support. The plate backs up the blade to permit the application of maximum feed pressure with minimum strain on the blade.

The saw frame is balanced in its reciprocating travel by dual hydraulic cylinders, and the driving rod to the frame is connected in line with its center. It is said that all parts of this machine have been made readily accessible for cleaning and adjustment. Chip capacity of the machine has been increased 60 percent.



Kyle-Johnson quick-change lathe tool

Kyle-Johnson Lathe Tool Provides Quick Tool Change

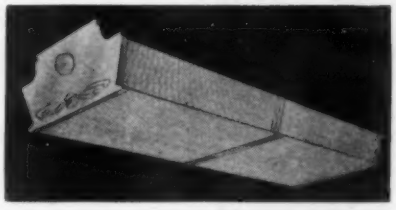
A quick-change engine lathe tool, which makes possible necessary change to any kind of operation without the use of a wrench after set-up, has been produced by Kyle-Johnson Machine Co., 1627 West Pico St., Los Angeles, Calif. A couple of hand turns of the drawscrew lock release the tool to be removed.

Drilling is facilitated by using the machine feed. Threading, turning or alternative operations in any combination may be performed. Side forming is accomplished as the K-J toolholder is claimed to be rigid and excess overhang eliminated. For boring, the holder will accommodate boring bars ¼ to 1 in. All torque is taken up by the vertical adjustment screw.

Spero Fluorescent Fixture Features Translucent Panels

Spero Electric Corp., 18222 Lanken Ave., Cleveland, Ohio, is producing a fluorescent fixture designated as URC-448 which is made for four 40 watt lamps, and is equipped with translucent diffusing glass panels at the side and bottom to shield the light source. It is said that these glass panels eliminate objectionable glare and shadows.

This installation is suitable for three types of mounting: flush to the



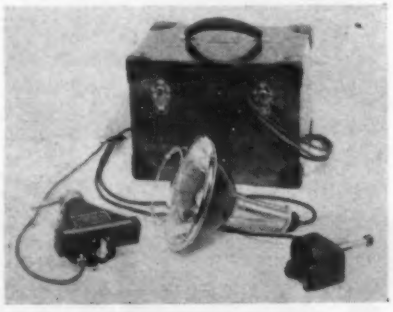
Spero fluorescent fixture

ceiling, pendant, or in a continuous row. The unit is available with conventional type ballast and starters or with Insta-Lite, which combines the functions of ballast and starter.

Vibroscope Balancing Equipment Includes Remote Control Switch

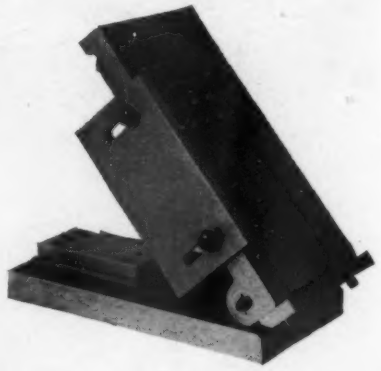
The Davey portable balancing equipment, made by The Vibroscope Co., 6 East 39 St., New York 16, N. Y., for dynamic balancing of machine parts of all sizes, is now supplied with a remote control feature.

The equipment, consisting of a vibrometer which measures vibration amplitude directly and a stroboscope which gives a direct visual reading of



Davey balancing equipment

"high spot" or phase angle, includes a remote control switch mounted on the vibrometer. This places the entire operation in the hands of a single operator instead of adjustments being made by a second operator. Two models are available, weighing 22 and 25 lb. respectively. They come in a portable case with batteries.



Carruth sine plate

Carruth Offers Sine Plate For Angular Measurement

Carruth Sales Co., 704 Boulevard Bldg., Detroit, Mich., has available a sine plate to facilitate checking of angular measurements in the inspection of tools and parts. This instrument will measure the included angle on parts from small objects to those as large as 6×10 in.

The desired angle between the stationary locating plate and the cylindrical gage bar on the movable block is obtained by building up the angle with gage blocks. The block is provided with 54 tapped holes of ⅜ in. diameter for clamping the work. The movable block is equipped with a guide plate at one end and another for use on either side.

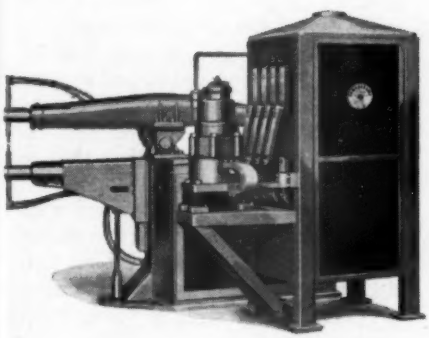
Cincinnati Releasing Box Tool Uses Stock Lathe Toolbits

Valley Tool & Supply Company, 5507 Morella Ave., N. Hollywood, Calif., is offering a releasing box tool for use on turret lathes. Known as the Cincinnati No. 2, it has a turning capacity of ¼ to 1/16 in. diameter, 3 in. long. Stock ground lathe toolbits are used with the holder.

A retracting tool mechanism draws the tool bit away from the turned stock. Adjustment on this mechanism is such as to permit settings down to a thousandth inch with a screwdriver. A rocker under the toolbit enables the operator to locate center quickly after

Announcing "STORAGE BATTERY" WELDERS

by PWC



The PWC STORAGE BATTERY Welder is already in use, welding aluminum for war materiel.

What a STORAGE BATTERY Welder is:

A modified PWC resistance welder (gun or machine type) with specially designed storage batteries instead of transformers or condensers . . . a simple non-arcing D-C controller-contactor (Patent applied for) . . . a continuous battery-charging low line-load instead of momentarily high power demand . . . Operated with a simple sequence weld-timer.

What a STORAGE BATTERY Welder does:

Eliminates reactance losses between power supply and electrodes . . . Eliminates inductive losses in the welding "loop" . . . Operates with virtually unity power factor . . . Eliminates high voltage "danger" . . . Provides maximum simplicity of maintenance.

What STORAGE BATTERY Welding means:

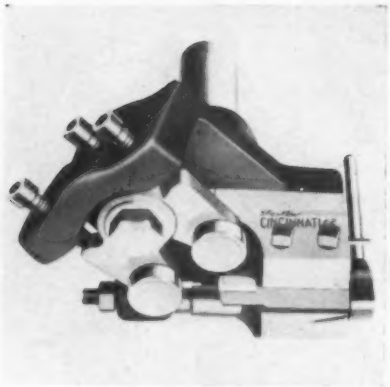
Lower cost stored energy welding equipment . . . Lower operating cost including vastly lower power cost . . . Ability to spot-weld aluminum even where power line capacity is relatively low . . . High efficiency even when welding at considerable distance from power supply . . . Less critical adjustments to get consistently good welds . . . Vastly simpler to operate.

Ask for Bulletin No. 901

PROGRESSIVE WELDER CO.

SEAM PRODUCTION & BUTT . . . *Electric Welding Equipment* . . . PORTABLE GUN & PEDESTAL

3050 E. OUTER DRIVE • DETROIT 12, U. S. A.



Cincinnati No. 2 box tool

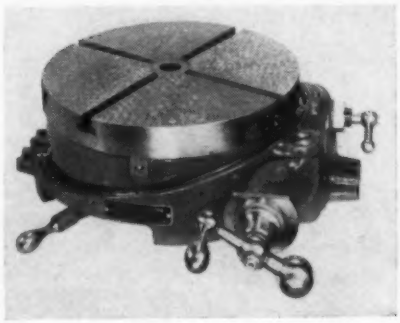
regrinding the tool. Set screws behind the toolbit may be used for setting the tool at an angle, while still providing a support behind the tool. The roller assembly may be moved in or out without changing the setting of the rollers.

Infra-Red vibrating dryer

Infra-Red Makes Vibra-Veyor For Plastic and Other Powders

The latest development in a line of infra-red ovens made by the Infra-Red Engineers & Designers, 1633 E. 40th St., Cleveland, Ohio, is the No. 758 Miskella Infra-Vibra-Veyor designed for drying, preheating and dehydrating plastic powder and similar products. The unit carries powders under the drying and heating lamps at a rate of 40 lb. per hr. and operates on 220 volt electric current.

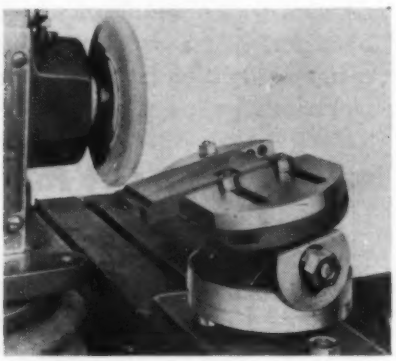
Offered as optional equipment with the dryer is automatic control to govern any combination of lights and thus acts as a temperature control. Also available as extra equipment is bench-truck for moving the machine when required. The vibrator, noiseless in operation, is activated by a magnet which pulsates at the rate of 3,600 vibrations per min. The unit, without extras, is 36 in. high, 18 in. wide and 4 ft., 6 in. long.



Index rotary table

Index Toolroom Rotary Table Has Single-Motion Table Lock

A 12 in. toolroom rotary table, manufactured by Index Machine & Tool Co., is available through Blank & Buxton Machinery Co., 3100 East Michigan Ave., Jackson, Mich. The table is equipped with a ball type main bearing, quick-acting worm throw out, and a single-motion table lock which is said not to cramp the table out of alignment. A coolant trough is cast in the base.



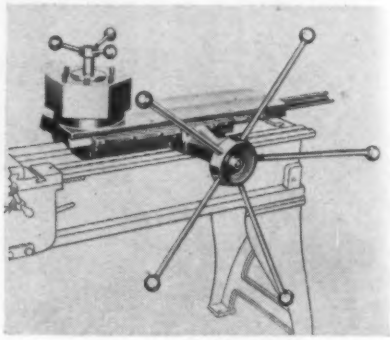
Oster chase grinding fixture

Oster Develops Fixture for Grinding Thread Chasers, Dies

A universal chaser grinding fixture that can be easily mounted on the table of any conventional tool and cutter grinder is being made by the Oster Manufacturing Company, 2057 E. 61st Street, Cleveland 3, Ohio. The fixture is adjustable for any throat or rake angle desired and will handle all sizes and types of dies or chasers. Overall size is $5\frac{1}{2} \times 5\frac{1}{2} \times 9$ in. and the fixture weighs 25 lb.

Lynn Bed Turret Makes Lathe Suited to Screw Machine Work

A heavy-duty self-indexing bed turret is being manufactured by Lynn Manufacturing Co., 232 Elroy St., Minneapolis 8, Minn. This Model BT-3 bed turret fits large standard engine and other lathes up to 24 in. swing and converts them for screw machine



Lynn self-indexing bed turret

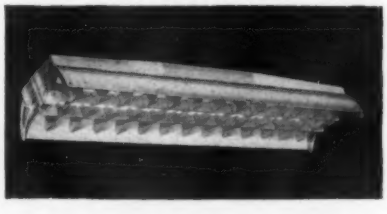
and turret work. Also, this unit may be mounted on standard turret lathes. It is equipped with an adjustable base.

The turret has a 10 in. travel, and is provided with an automatic index of stops to each of the six positions. The head is designed to bore tool holes to $1\frac{1}{2}$ in. or less when mounted on the operator's lathe.

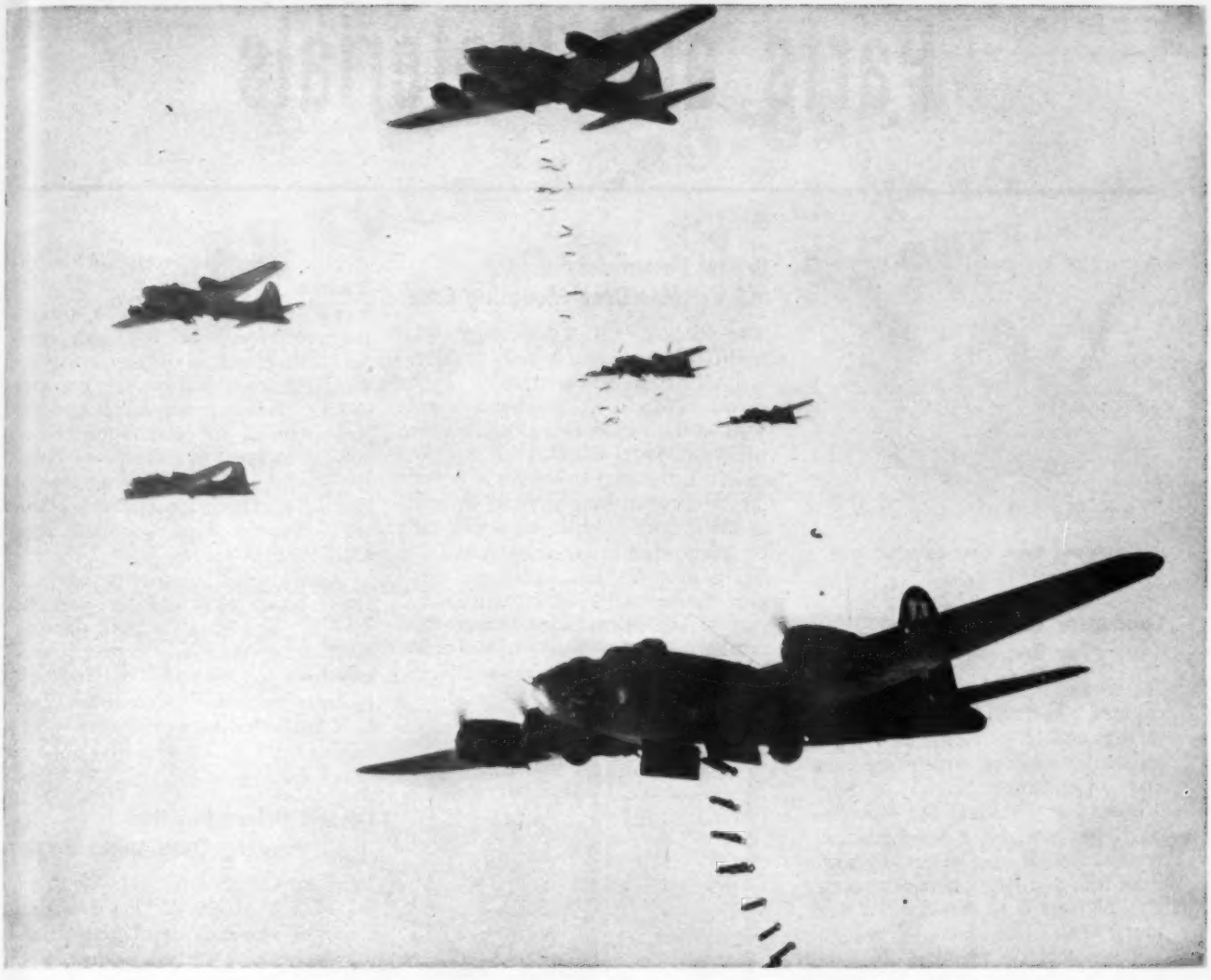
Futurliter Fluorescent Light Made in Eggcrate-Louvred Style

The Futurliter luminaire, made by Edwin F. Guth Co., 2615 Washington Ave., St. Louis 3, Mo., has been designed in an eggcrate-louvred style and is suited for close-ceiling or ceiling suspensions. The unit can be mounted singly or end-to-end in continuous runs for 50 to 75 foot-candle installations. Each 48 in. unit is available for use with either two or three 40 watt lamps.

This fixture can be furnished with conventional ballasts with starter switches or with the Quick-Liter ballast which does not use starter switches and operates at lower voltages.



Futurliter luminaire



★ ★ ★ **"A million ball bearings are over Berlin"**

And New Departure, America's most productive ball bearing plants, has put them there in Forts and Liberators to batter and blast the center of Nazidom.

In these supreme tests of performance, New Departure ball bearings serve in engines, props, superchargers, bombsights, instruments and many other parts of equal importance. They bear the loads and locate moving parts accurately—help make these heavy bombers function to perfection.

They take 'em there and bring 'em back!

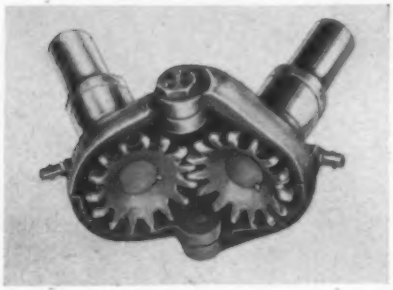
The importance of ball bearings in this war emphasizes the job they will do for post-war machines and appliances—even better New Departure Ball Bearings because to half a century of experience will be added the lessons of wartime performance.

New Departure, Division of General Motors, Bristol, Connecticut. 3228

Nothing Rolls Like a Ball

NEW DEPARTURE BALL BEARINGS

Parts and Materials



Condenser bevel gear universal joint

Condenser Universal Joint For Remote Valve Control

For remote control of valves, pumps, engines, turrets and other equipment in inaccessible locations, or for centralized control of widely separated units, Condenser Service & Engineering Co., 95 River St., Hoboken, N. J., has available a bevel gear universal joint. It operates at any angle from 0 to 135 deg. on vertical center line, or from 0 to 360 deg. on horizontal center line.

The joints are made in five sizes for shaft diameters of ½, ¾, 1, 1¼ and 1½ in. Capacity of the unit ranges from 1,580 to 4,398 in. lb. at 49 r.p.m.

Gears are cast manganese bronze and require no lubricant to absorb play or backlash. Housings are cast brass and are fitted with Alemite nipples for shaft lubrication. The rotating pin on the housing locks in place. Shafts are steel, pressed into the gears and keyed with hardened pins which are claimed not to shear.

Waverly Produces Flix Pad For Removing Oil and Grease

Flix for removing oil and grease from the hands and arms has been produced by Waverly Petroleum Products Co., Drexel Bldg., Philadelphia, Pa., and Refiners Lubricating Co., 601 West 26 St., New York, N. Y. It is a hand-sized, semi-quilted pad which contains an effective absorbant substance. The manufacturer claims that it will not burn and helps prevent skin diseases. It is useful in removing oil from machine parts.

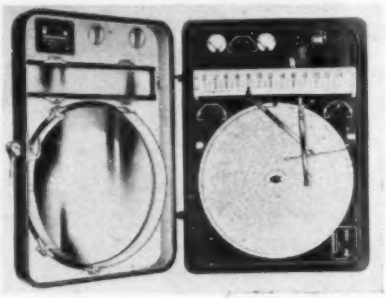
Bristol Potentiometer Has Deep Mounting Case

The Bristol Co., Waterbury 91, Conn., has redesigned its Pyromaster self-balancing potentiometer. It is known as Model 431 and has a deeper wall or flush mounting case than the previous Model 440M. Pen and indicator drive mechanism are mounted on the internal hinged panel as well as the control mechanism, which can be either electric or air-operated.

This deep case and inner panel provide for servicing or replacing any part of the instrument without disturbing any other part. In the electric type controller, it is possible to include the control relays in the instrument.

The indicating scale on the indicating-recording model is a wide horizontal band instead of the rectangular dial type provided on the previous model. The stepping relays and the slide wire in the potentiometer circuit are inclosed in a dustproof Bakelite housing. A standard cell type of manual standardizing circuit replaces the voltmeter type supplied with Model 440M.

Model 431 Pyromaster has the same basic principle as previous models, providing a self-balancing round chart recording potentiometer without continuously moving elements, and requires no lubrication. It is unaffected by vibration.



Bristol Model 431 Pyromaster potentiometer

Cassell Offers Positive Printing Developing Paper

John R. Cassell Co., 110 West 42 St., New York, N. Y., has available a line of ammonia developing printing papers in blue line, maroon line and sepia transparent sensitized tracing paper. This product is being marketed under the name Casco-Azo.

Du Pont Polythene Plastic Suited to Making of Products Such as Electrical Insulation and Waterproof Coatings

Polythene, a plastic which is adaptable to the manufacture of such products as adhesives, insulation for electric wiring and cables, waterproof coatings and piping, has been made available in substantial quantities only for war purposes by E. I. du Pont de Nemours & Co., Wilmington 98, Del. Many other uses will be found for this plastic when it becomes generally available.

Among the outstanding properties claimed for this material are its flexibility and toughness over a wide range of temperatures, good resistance to water and penetration by moisture, chemical inertness and excellent electrical properties.

Polythene is readily molded and fabricated by present methods with existing molding and shaping equipment. It can be extruded, injection molded, compression molded and calendered. In sheet, rod or tube form it can be machined, cut, blown, blanked or swaged.

M.S.A. Produces Cabinet With Fogpruf Goggle Cleaner

A goggle cleaning cabinet has been developed by Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh 8, Pa. It is equipped with Fogpruf, a lens cleaning and anti-fogging agent, and optical wiping tissues. The unit is suited for wall mounting or for use on traveling goggle dispensing carts.

Two vials of Fogpruf are provided in the dispensing block, permitting

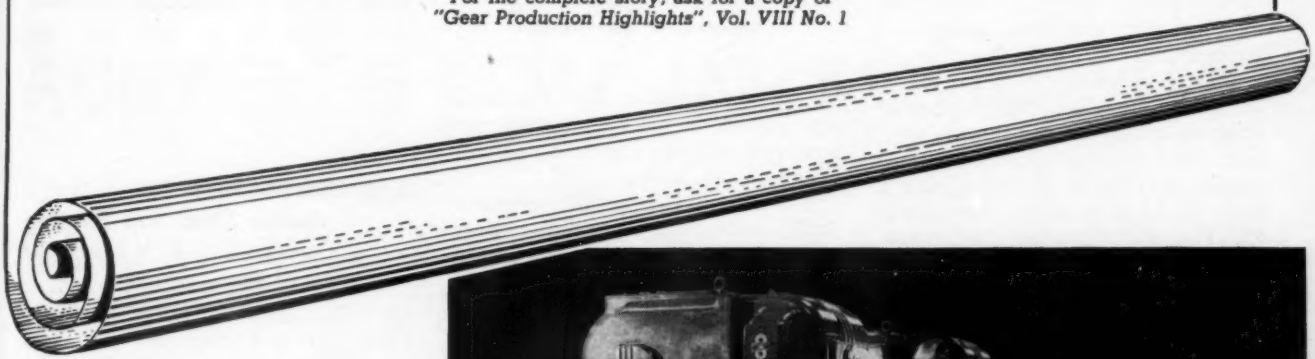
"...SHAVED AERO-GEARS can be made equal to or superior to Ground Gears..."

... as reported in "American Machinist"

Ford currently is finishing 27 P & W aircraft engine gears by "shaving", with the following results:

1. Time cut from 40 minutes to 5 minutes.
2. Eliminates "burnt" teeth.
3. No change in hardness required, but shaved gears are somewhat *harder* than ground gears.
4. Involute error ± 0.00015 inch.
5. Parallelism held within 0.0002 inch.
6. Tooth spacing error, max. 0.0001 to 0.0002 inches.
7. Face runout averaged 0.0005 to 0.0001 inches.

For the complete story, ask for a copy of "Gear Production Highlights", Vol. VIII No. 1



AT ANOTHER plant, this battery of 860-B machines, similar to those used by Ford, is shaving gears for water-cooled aircraft engines, too.

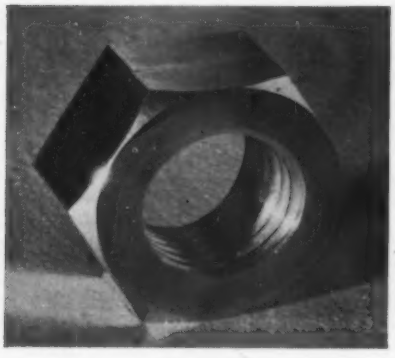
ORIGINATORS of GEAR SHAVING

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD • DETROIT 12, U. S. A.

BUY U.S. BONDS STAMPS

the cleaning of two pairs of goggles at a time. A tap on either button of the dispenser sprays Fogpruf on the lens. The cleaning tissues are withdrawn from an opening in the top of the cabinet.



Stover vibration-resistant nut

Stover Vibration-Resistant Nut Grips Without Use of Washers

A vibration-resistant nut is being manufactured by Stover Lock Nut & Machinery Corp., Bushkill Drive, Easton, Pa. This product is available in both U.S. Standard and S.A.E. thread from 1/4 to 1 1/2 in. bolt size in mild and alloy steel, brass and plated finishes.

Inherent elasticity of the steel in the wall of a nut is utilized to provide gripping action on the threads of a bolt. This action is obtained by compressing the top of the nut against a taper-threaded, hardened steel mandrel. This makes the threaded section of the nut elliptical at the top and leaves the bottom round. The nut has tolerances as prescribed for Class 3 fit. The gripping action keeps the nut from loosening under vibration. No washers are required.

Hillegas Cowhide Hip Tool Kit For Holding Workers' Tools

E. F. Hillegas Co., 516 Allen Ave., Glendale, Calif., has available a hip tool kit which is made from soft chrome elk tanned cowhide. It is said that the material is not affected by oil or water and will not stretch.

This kit is worn on the belt. A large pocket is provided for drivers, cutters, pliers, chisels and the like; while two medium pockets hold knives, markers, rules. One long pocket holds a large screwdriver, and a small pocket is suited for punches, drills and scribes. A loop holder is provided for hammer or large cutter.

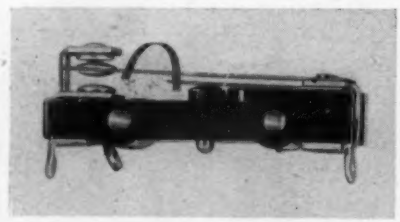
Electromode Unit Heater Has Thermostatic Control

Suited for heating isolated buildings, offices or space where intermittent and high heating is desired, Electric Air Heater Co., Div. of American Foundry Equipment Co., 555 South Byrkit St., Mishawaka, Ind., has available the Electromode unit heater. It can be furnished in either portable or suspension models. Heaters from 1.5 to 4 kw. capacity can be supplied with eyebolts for wall or ceiling suspension, or equipped with a handle

Electromode unit heater

for use as a portable unit. The heaters from 5 to 60 kw. capacity are equipped only for suspension mounting.

The Electromode can be thermostatically controlled, preventing over and under heating. It is said that the extended fin surface, with heat and corrosion resisting finish, affords large heat capacity at low heat density.



Acro midget snap-action switch

Acro Midget Snap Switch Adapted to Machine Tools

A midget snap-action switch is being offered by Acro Electric Co., 1321 Superior Ave., Cleveland 14, Ohio. This switch is built on the rolling spring principle and made to maximum dimension of 1 1/2 in. It is 9/16 in. wide, 7/16 in. thick, and weighs under an ounce. The unit is adapted to electronic control devices, machine tools, aircraft and electrical appliances.

The switch is designed for actuation from either the top or bottom. Its component parts are non-corrosive. It is furnished in single pole, normally open, normally closed and double throw with both pretravel and overtravel provided.

Dayton Rogers Marking Fluid For Strips and Bar Alloys

Identification marking fluid in 12 colors to coincide with arbitrary code systems in the average stockroom is available from Dayton Rogers Manufacturing Co., 2835 12th Ave. S., Minneapolis 7, Minn. This fluid is used for marking of sheet strips and bar alloys.

The compound may be used on all layout work or inspection departments, in the identification of metal parts. The use of the fluid does not require polishing or finishing of the material to be identified. It is brushed on and dries immediately.

A remover for this fluid obliterates marks no longer required. It is packed in a combination brush-in-cover containers for shop use. Ink pads and marking pens are furnished with the identification material.

Aero Oversize Rivet Set Avoids Thin Skin Dinging

An oversize rivet set 2 1/2 in. in diameter is being manufactured by Aero Tool Co., 231 West Olive, Burbank, Calif. It is said to eliminate the danger of dinging thin skins. This set is made of tool steel and a mirror-like finish on the crown surfaces protects thin skins from dents and abrasions while riveting.

Aero oversize rivet

LAUNDERED COAL IMPROVES STEEL

At the steel plants, coal is laundered by washing and drying to rid it of impurities. This operation, as well as others born of coal research – the sampling, testing and blending of coal at the mines – contributes to production of stronger, cleaner-burning coke, the fuel for blast furnaces. With better coke, more and better iron is produced and the tonnage and quality of steel improved.

Research at the mines and limestone quarries and in the steel plants, improves and safeguards quality and advances production of new steels which are now helping to win the war. After the war is won, these new steels will continue to serve America by contributing to peace-time prosperity.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

J&L STEEL

CONTROLLED QUALITY STEEL FOR WAR

J&L STEEL

Fleetweld 37 Electrode for Either A.C. or D.C. Welding

Latest of the group of Fleetweld electrodes manufactured by The Lincoln Electric Company, Cleveland, Ohio, is Fleetweld 37 for welding mild steel in all positions, with either alternating or direct current. Designed as an easy striking, smooth operating electrode for light gage material, it is also said to be fast operating under all conditions. There is no slag interference when welding vertical down, promising good, fast results on 8- to 16-gage steel.

The ability of Fleetweld 37 to withstand higher currents, makes possible higher welding speeds than are normal. With proper currents it will neither stick nor burn through—especially desirable characteristics for light gage welding.

Physical properties of all weld metals specimens are as follows: tensile strength, 70,000 to 80,000 p.s.i., yield strength, 60,000 to 68,000 p.s.i. and ductility (elongation in 2 in.), 18 to 25 percent. The electrode is available in 1/8, 5/32, and 3/16 in. sizes in 14 in. lengths and packed in 50 lb. standard containers.

Palmer-Shile Truck and Rack Designed to Handle Oil Drums

For handling oil drums, Palmer-Shile Co., 780 South Harrington Ave., Detroit 17, Mich., has built a combination truck and drain rack. It has heavy angle-iron frame construction and tubular handles, and is equipped with two 8-in. roller bearing wheels.

To load, the truck is tilted against the drum and the steel fingers are slid down to engage the top rim of the drum. Then the truck is rocked back to wheeling position and loading is automatic. A slight downward push on the handles raises the wheels and lays the rack on the floor, thus providing a convenient drain for the drum.

Palmer-Shile truck and rack

Heil heating coil

Heil Carbon Heating Coil For Acid Cleaning Tanks

A graphitic carbon heating coil for heating tanks containing acid cleaners used to prepare aluminum aircraft parts for spot-welding has been produced by Heil Engineering Co., 12901 Elmwood Ave., Cleveland, Ohio. The coil is made in standard sizes and in any shape for a variety of uses. It is said to be impervious to chemical action and non-metallic, and has a heat conductivity between that of steel and copper.

This coil can be used for heating, pickling, electroplating and metal etching baths. The coils are supplied for heating of solutions, and steam jets are furnished for direct introduction of steam to perform both heating and agitation.

Cerrobend used for dies for prototype

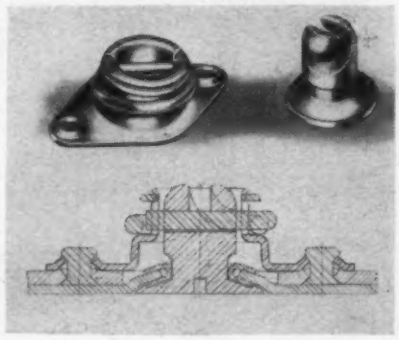
Castaloy Develops Method of Making Prototype, Sample Dies

A production method of making drop hammer dies for prototype and sample parts has been installed in two plants of Castaloy Corp., 197 South Waterman, Detroit 17, Mich. A master model or templet is constructed, then a plaster pattern of this master model is made by casting. The dies are cast directly from standard size plaster patterns of the part in a large tank containing circulating, cooling liquid. Cooling of a die is said to be accomplished in about 45 min.

The metal used is a low melting point alloy known as Cerrobend. It can be pumped through a long, rubber hose. As Cerrobend cools it does not shrink, thus eliminating machining problems. The desired thickness of the metal is added to the die by means of a special spraying technique. Aluminum, steel, plastic parts can be made in quantities of from 1 to 50 or more.

Elastic Stop Nut Produces Plane Spring-Lock Fastener

Elastic Stop Nut Corp. of America, Union, N. J., is making a spring-lock fastener which is particularly suited for holding the engine cowlings of airplanes. In addition, this fastener has many postwar commercial applications such as access plates on farm machinery, panels on motor trucks and at any point where a vibration-proof fastening is required. This unit is lightweight and of rugged construction.



Elastic spring-lock fastener

Japan Plastic Coating Method Protects Parts for Export

A method of preparing metal parts for export shipping is being offered by Japan Co., 5103 Lakeside Ave., Cleveland, Ohio. Parts are coated with an ethylcellulose plastic material which encases them with a cohesive film, protecting them from air or moisture. Once coated, the parts can be boxed for shipping without delay.

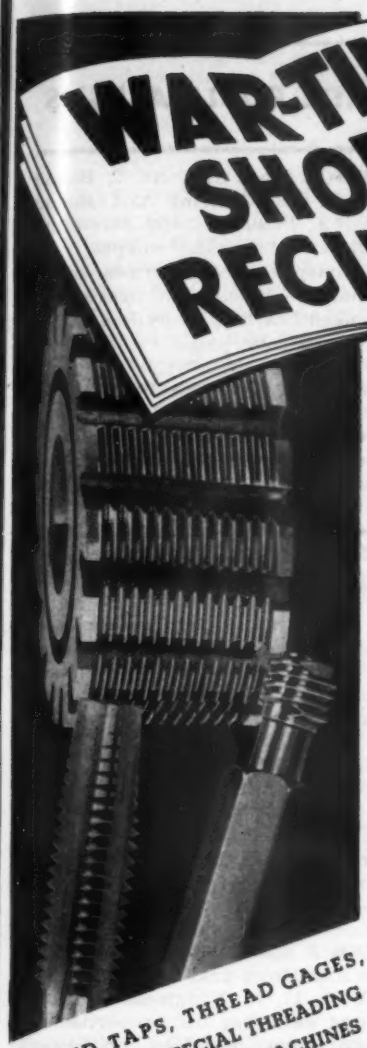
It is said that the high melting point of this plastic material gives protection from any normal extremes of temperature and that the coating is not embrittled or otherwise adversely affected by subzero temperatures. The film can be stripped off by slitting it with a pocket knife.

Post-war applictions for this material are expected to include any situation where a corrosion- and abrasion-resistant covering is needed.

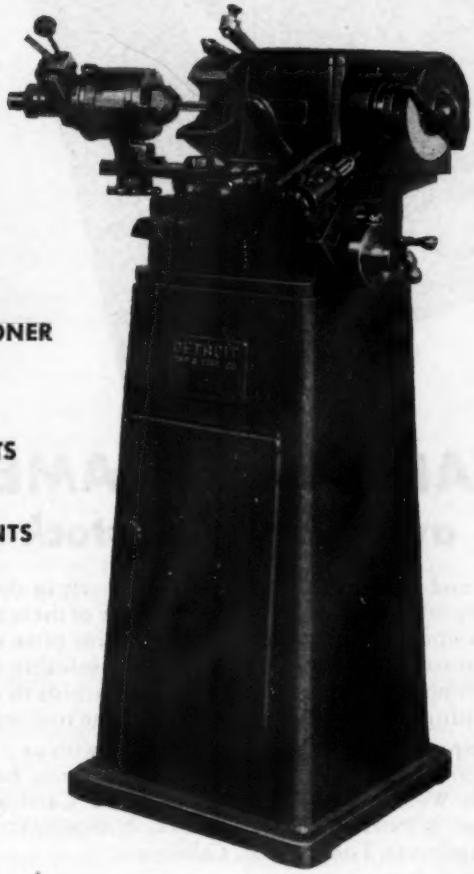
WAR-TIME SHOP RECIPES

DULL TAPS COST *MORE* than SHARP ONES

Dull taps wear out quicker
Dull taps increase scrap
Dull taps decrease thread accuracy



GROUND TAPS, THREAD GAGES, THREAD HOBS & SPECIAL THREADING TOOLS. SPECIAL TAPPING MACHINES



"DETROIT" TAP RECONDITIONER CHAMFERS

•

SPIRAL POINTS

•

POLISHES POINTS

•

The Detroit Tap Reconditioner makes it easy to keep taps sharp, quickly pays for itself, cuts tapping and tap costs.

The Detroit Tap Reconditioner puts you in a better position to meet tomorrow's stiff post-war competition.

Ask for Bulletin No. TRM-2

BUY U.S. BONDS STAMPS

DETROIT TAP & TOOL CO.

8432 BUTLER DETROIT 11, MICH., U.S.A.

W-S Standard Reamers with Carbide tips. Tapered shank (illustrated) and straight shank types. Sizes: ¼ to 1½.

STANDARD REAMERS
available from stock

REAMERS and many other cutting tools formerly in the "special" class are STANDARD with us. The majority of these STANDARD cutters is in stock *most of the time.* Our broad line often enables the consolidation of tool orders and saving of valuable time. Each W-S tool is tipped with the correct grade of carbide to do the best possible cutting job on the metals for which the tool was ordered.

Carbide tipped tools are not just a specialty with us . . . we make them *exclusively.* You can *expect* and *get* uniform, high quality results with W-S tools. Write for new FREE Catalog 144 and latest prices. WENDT-SONIS COMPANY, HANNIBAL, MISSOURI. Factory Warehouse: Long Beach, California.

SAVE TIME . . . wire or phone your requirements!

W-S Carbide Tipped Core Drills available in straight and tapered shanks. Sizes: ½ to 1½.

Concentricity of W-S Carbide Tipped Centers is guaranteed to within .0002" or less.

WENDT SONIS

CARBIDE TIPPED CUTTING TOOLS

REAMERS · CENTERS · CORE DRILLS · COUNTERBORES · TOOL BITS · SPOT FACERS
MILLS · HOLLOW MILLS · ROLLER TURNING TOOLS · BORING TOOLS · SPECIAL TOOLS

TRADE PUBLICATIONS

BEARINGS Stock List No. 2, Bound Brook Oil-Less Bearing Co., Bound Brook, N.J., includes many heretofore unpublished sizes and shapes, and gives dimensions and prices on a large number of sizes in sleeve type and flanged bearings as well as thrust washers and solid plugs.

CHAIN BELT DRIVES Bulletin No. 435, published by Chain Belt Co., 1600 W. Bruce St., Milwaukee 4, Wis., gives information on maintenance, lubrication and repair of chain belt drives.

CLUTCHES Catalog K 8 of Kinney Manufacturing Co., 3529 Washington St., Boston 30, Mass., describes, pictures and gives specifications and prices of its line of clutches. Included are interchange type solid sleeve, dry plate disc and oil type friction clutches and Worrall type cut-off coupling.

CONTROLLERS Furnas Electric Co., 444 McKee St., Batavia, Ill., offers bulletin No. 4303, giving descriptions, wiring diagrams and dimensional drawings for multi-speed drum controllers for machines operated by motors ranging over 10 hp.

COPPER A booklet issued by Revere Copper and Brass Inc., 230 Park Ave., New York 17, N. Y., gives specifications and describes the properties of the various types of copper and copper alloys produced by that company.

CUTTER BODIES A booklet describing its Meehanite milling cutter bodies has been issued by Farrel-Birmingham Co., Ansonia, Conn. The booklet describes advantages of design, tells why Meehanite is most suitable for the purpose, and explains procedures for preparing the cutter bodies for use and applying the cutting tips.

CUTTING FLUIDS Standard Oil Company of New Jersey, Engineering Div., 26 Broadway, New York 4, N. Y., has re-issued its "Cutting Fluids" brochure, which includes photographs on various machine operations, subject matter on cutting and soluble oils, suggestions on the use of cutting fluids and other information pertinent to the use of each.

DRILLING MACHINES A catalog insert prepared by The Gear Grinding Machine Co., 3939 Christopher St., Detroit, Mich., gives specifications and a picture of that firm's type GDS-2 straight groove drilling machine.

GRINDERS The complete line of DoALL surface grinding equipment, accessories and supplies manufactured by Savage Tool Co., Savage, Minn., is pictured and described in its new 20-page booklet.

HEALTH A wartime guide to the industrial health and staying powers of war workers has been published by the National Association of Manufacturers, 14 West 49 St., New York 20.

HEAT TREATING Surface Combustion, Toledo 1, Ohio, has available a series of five bulletins describing and picturing various types and uses of heat treating furnaces it produces. Bulletin SC-109 is devoted to batch type gas carburizing furnaces; SC-110, annealing and normalizing in surface combustion furnaces of controlled atmosphere and direct-fired types; SC-111, modern malleableizing in surface combustion furnaces; SC-112, surface combustion hardening furnaces; and SC-113, surface combustion draw furnaces of convection and direct-fired types. A sixth bulletin, SC-114, treats of heating and heat treating of light metals in surface combustion furnaces.

HEAT TREATING SALTS A file-folder type of pamphlet issued by G. S. Rogers & Co., 228 N. La Salle St., Chicago 1, Ill., is devoted to liquid bath carburizing salts and casing salts. It is No. 2 in a series of heat treating salt bulletins.

HYDRAULIC ARBOR PRESS A fully illustrated bulletin, describing the complete line of hydraulic arbor presses manufactured by K. R. Wilson, 10 Lock St., Buffalo, N. Y., has been released. It describes the line of standard KRW presses ranging from 25 to 75-ton capacity.

HYDRAULICS An 18-page catalog section issued by Hydraulic Machinery, Inc., 12825 Ford Road, Dearborn, Mich., describes hydraulic power units, test benches, special machinery and presses as applied to machine tools and aviation.

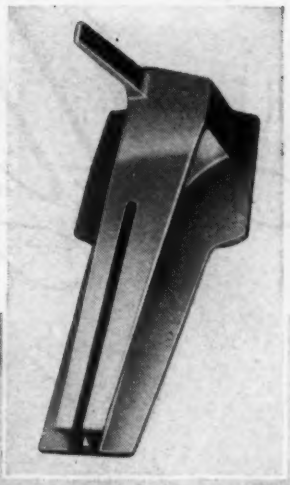
INSPECTION Davis & Thompson Company, 6619 W. Mitchell St., Milwaukee, Wis., offers a folder describing its tubular micrometers and standards "for tool room accuracy in heavy industry."

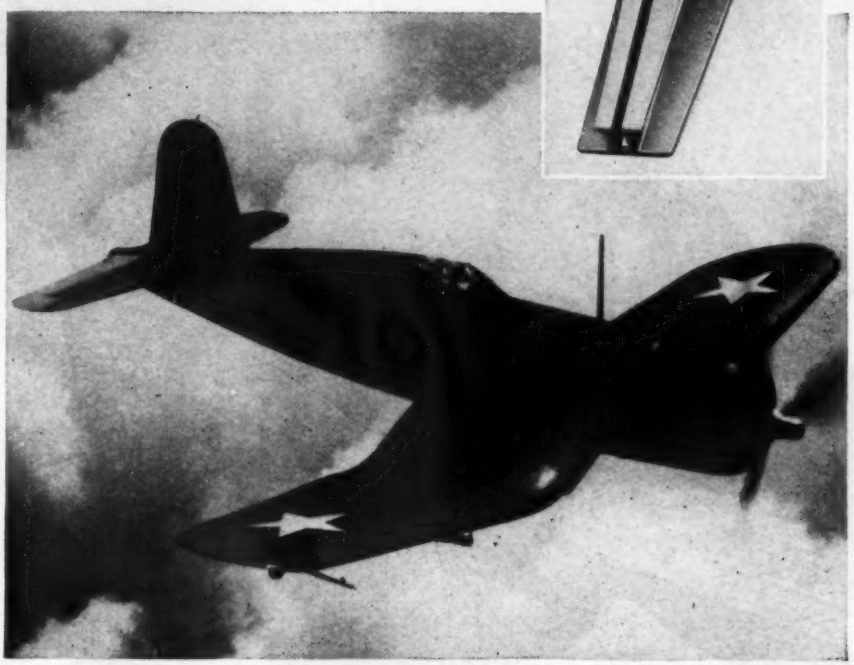
INSTRUMENTS A booklet issued by Televiso Products, Inc., 6533 N. Olmstead Ave., Chicago 31, Ill., contains pictures and descriptions of the main functions and applications of aircraft gyro instruments, aircraft vibration test instruments, aircraft industrial production testers, industrial vibration measuring instruments and electromechanical laboratory and production test equipment.

JOB RELATIONS A booklet has been designed by Economy Pumps, Inc., Hamilton, Ohio, to promote a better feeling of cooperation between employees and management; also emphasizes safety rules and regulations.

LIGHTING A booklet, "Design for Efficient Industrial Seeing," has been published by The Fostoria Pressed

Precision made by FENN for Brewster





OFFICIAL U. S. NAVY PHOTOGRAPH

IN the legendary Corsair, built by Brewster for the Navy, only the finest materials and workmanship find a place. Among these is the bulkhead fitting shown above — a solid aluminum forging, machined to closest tolerances. When F3A Corsair goes into action, everything that engineering skill can contribute has been done to meet the exacting government specifications. From the Fenn Plants a steady flow of precision built parts and assemblies go to manufacturers of planes and other vital war products.

FENN FOR SPECIAL MACHINERY

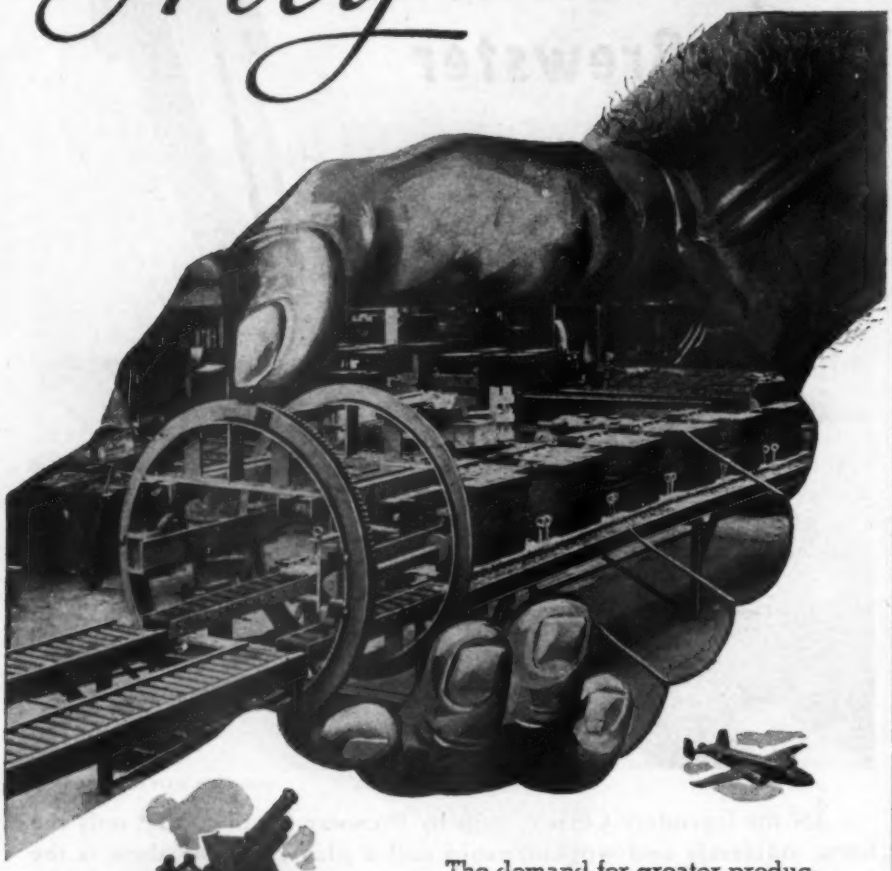
Years of experience in the design and building of Special Machinery has given the Fenn organization a skill and know-how that may prove helpful to you in the days which lie ahead. We have the plants and facilities for handling almost any size and kind of special machinery job and we welcome inquiries from those who are looking for a dependable source.

PLANNING NOW FOR 1945 PRODUCTION

When the time comes for reconversion to peace time production, Fenn engineers, toolmakers and machinists will be ready to serve you. It is not too early to think of planning now.

THE FENN MANUFACTURING CO.
HARTFORD, CONNECTICUT

THE *Ally* OF PRODUCTION



The demand for greater production of vital war materials has increased the need for highly efficient equipment for handling those materials. The conveyer system, which is the result of thorough engineering and careful planning, is indeed an ally of greater production. Mathews Engineers at the Factory and in the field are on the job long hours these days, giving manufacturers of war materials the help they require in keeping the production performance climbing.

MATHEWS CONVEYERS FOR MECHANIZED PRODUCTION

If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer.

MATHEWS CONVEYER COMPANY ELLWOOD CITY PENNSYLVANIA

Steel Corp., Fostoria, Ohio, "to help those persons in industry who must consider lighting-for-seeing problems.

MATERIALS HANDLING A booklet published by The Yale and Towne Manufacturing Co., Philadelphia Div., Philadelphia 24, Pa., describes its line of modern materials handling machinery and pictures typical installations.

METAL CLEANING AND DRYING Industrial Washing Machine Corp., New Brunswick, N. J., has published a ten-page illustrated catalog showing the various types of metal cleaning and drying equipment it manufactures and describes the parts which can be cleaned in this equipment.

METALLIZING ACCESSORIES Catalog 42B, recently issued by Metallizing Engineering Co., 38-14 30th St., Long Island City 1, N. Y., describes Metco metallizing guns, wires, surface preparing tools and other metallizing accessories in detail.

PRECISION EQUIPMENT Vinco Corp., 9099 Schaefer Highway, Detroit, Mich., has published a 16-page bulletin describing and illustrating the gages and other checking machines and devices it produces.

PRESSES Bulletin No. 5000 issued by Elmes Engineering Works, 230 N. Morgen St., Chicago 7, Ill., describes the hand molding, semi-automatic and transfer molding presses used for compression and transfer molding processes.

PUMPS Bulletin 433 of Chain Belt Co., 1600 West Bruce St., Milwaukee, Wis., illustrates and gives complete information concerning the mechanical parts and construction of Rex Speed Prime Pumps. Specifications and capacity carts are included.

PYROMETER ACCESSORIES The Bristol Co., Waterbury 91, Conn., offers a Pyrometer accessory manual, No. P1211, giving engineering data on selection and installation of thermocouples, protection wells and lead wire; thermocouple and protection well assemblies; and calibration data and tables.

RECTIFIERS Ignitron mercury-arc rectifiers for 501 kw. and higher ratings, 250 to 900 v., are featured in a 36-page bulletin (GEA-3706), by General Electric Co., Schenectady, N. Y.

SAFETY An illustrated booklet entitled "Right on the Nose," which explains in detail the quickest, easiest methods of adjusting non-prescription industrial safety goggles so that workers wear them in comfort, has been published by the American Optical Co., Southbridge, Mass. A 16-mm. sound motion picture on the same subject and bearing the same title is available from the same company.

STANDARD CARBIDE TOOLS AND BLANKS Kennametal Inc., 103 Lloyd Ave., Latrobe, Pa., has issued catalog 43C in which the prices of standard tools and blanks have been reduced.

TAPPING HEADS Errington Mechanical Laboratory, Staten Island, N. Y., has prepared an envelope stuffer concisely picturing and describing its line of tapping heads.

TECHNICAL BOOKS A catalog of technical books has been issued by The Chemical Publishing Co., 26 Court St., Brooklyn 2, N. Y. Listed and concisely described are books on chemistry, technology, physics, general science, mathematics, engineering, radio, aviation, metals, technical dictionaries, etc.

THREAD GRINDING A "how to do it" bulletin (No. 25) on thread grinding has been published by the Dumore Co., 14 and Racine Sts., Racine, Wis. Typical thread grinding operations, samples of thread grinding by the Dumore method and other pertinent information appears.

TOOL STEELS A pocket-size, catalog section published by Jessop Steel Co., Washington, Pa., is devoted to description and performance charts of that firm's water hardening tool steel.

WELDING "The Eutectic Welder," is being published monthly by Eutectic Welding Alloys Co., 40 Worth St., New York, N. Y. It is devoted to welding news, design, metallurgy methods, cost analysis, useful tools and helpful hints and is available to persons making requests on company letterhead.

WELDING Youngstown Welding & Engineering Co., Youngstown, Ohio, has issued a 16-page catalog containing photographs and descriptions of a wide variety of welded steel crates, baskets, chains and accessories used in connection with pickling, enameling and heat treating operations.

WELDING A 36-welding data book published by Eutectic Welding Alloys Co., 40 Worth St., New York 13, N. Y., presents facts on low temperature welding for fabrication, salvaging and general maintenance, and gives hints on increasing welding efficiency and instructions for salvaging vital tools. Included is a chart to simplify rod selection and use.

WELDING, BRAZING, SILVER SOLDERING—Krembs and Co., 676 W. Ohio St., Chicago 10, Ill., has published a fluxine chart designed to facilitate selection of the best flux to use in connection with a host of metal-joining jobs.

WELD TESTING A pad containing 25 sheets, each with one edge ruled in 1/50ths of an inch up to 3 in. is offered by the Tempil Corp., 132 W.

CHICAGO MOUNTED WHEELS — The first small wheels ever mounted on stationary shanks, they have maintained their supremacy through the years. Over 300 sizes, styles and grains—one to suit every job. They're tough, long lived, dependable.

CHICAGO GRINDING WHEELS — To break production bottlenecks due to the crying need for small wheels, we gave up making all larger sizes for the duration —with full WPB approval—and now specialize on sizes 3" in diameter and under.

America's Unbeatables

Yes, all the wheels in our line are small, but powerful and *swift tools of war* doing their stuff day in and day out — making it possible to speed through everything that requires precision internal or external grinding, polishing and burring — bombsights, planes, tanks, guns, intricate instruments, etc.

PROMPT DELIVERY

Come to America's Headquarters for Small Wheels, custom built to your order. No waiting for shipments now, and after the war a reliable source of supply. Our central location is another asset—cuts shipping time to most plants.

Half a century of specialization has established our reputation as the Small Wheel People of the Abrasive Industry.

TEST WHEEL FREE

So that you will know what Chicago Wheels can do, we'll gladly send one without charge. Tell us material you want to grind and size wheel you'd like.

Send the Coupon for Illustrated Catalog

CHICAGO WHEEL & MFG. CO.

1101 W. Monroe St., Dept. AT, Chicago 7, Ill.

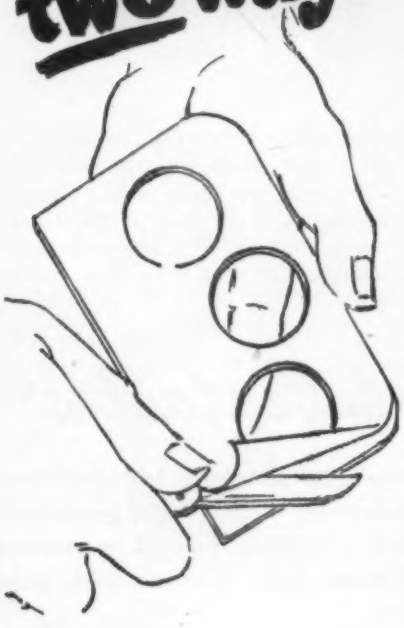
AT-2

Send catalog. Interested in ☐ Mounted Wheels ☐ Grinding Wheels ☐ Send Test Wheel. Size.....

Name .....

Address .....

accuracy two ways



REPLACE skill-wasting methods with quick precision while insuring accuracy of fit. Use Laminum shims to provide correct adjustment in both shop assembly and field service.

Shims cut to your specifications. Stock shim materials obtainable from your dealer. Write us for further information and shim application chart.

Laminated Shim Company
Incorporated
50 Union Street • Glenbrook, Conn.

LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT
2043

22 St., New York 1, N. Y., for weld bend testing, to replace and improve on the flexible steel ruler.

WELD INSPECTION A new and comprehensive arc welding inspection chart has been published by The Lincoln Electric Co., Cleveland, Ohio. Actual specimens of various results obtained in making fillet and butt welds are pictured and the appearance and characteristics of proper and improper weld beads are described briefly.

NEW BOOKS

DESIGN OF MACHINE MEMBERS, SECOND EDITION—*By Alex. Vallance, chief designer, Reed Roller Bit Company, and Venton Levy Doughtie, professor of mechanical engineering, University of Texas.* 558 *pages. Published by the McGraw-Hill Book Company,* 330 *West* 42 *St., New York* 18, *N. Y.* $4.

An engineer must be concerned with details, because upon the correct design of a bolt or a gear may depend the successful operation of an intricate machine. So a good part of the training of young engineers is to impress upon them the importance of attention to these details.

This volume, devoted to the design of machine members, is primarily a textbook, telling how such parts as shafts and clutches, bearings and belts, must be appraised and woven into the finished design of a mechanical product if they are to perform their functions efficiently, with adequate strength and yet not "beefed up" unnecessarily.

This second edition is a revision of the first which appeared five years ago. It brings the subject up-to-date by inserting information on nonferrous materials, both metallic and plastic. Some rearrangement of the original text has been made to give a clearer and more logical sequence to the subject matter.

•

LUBRICANTS AND CUTTING OILS FOR MACHINE TOOLS—*By William Gordon Forbes.* 90 *pages. Published by John Wiley & Sons, Inc.,* 440 *Fourth Ave., New York.* $1.50.

Oils play a big part in all branches of industry—and the machine shop is no exception. Here the products of petroleum have a dual role for they keep the wheels turning through their use of lubricants and they speed production as cutting oils applied at the point of the tool.

This volume tells how oil fills both these functions. It does more than that; it starts in with the basic characteristics of oils and greases, the means of testing and compounding them, and then goes into their application on different types and sizes of machine tools. The safety factor is not forgotten, as there is the chapter on skin infections with recommendations for their prevention.

•

LUBRICATION OF INDUSTRIAL AND MARINE MACHINERY—*By William G. Forbes* 319 *pages. Published by John Wiley & Sons, Inc.,* 440 *Fourth Ave., New York.* $3.50.

Perhaps no subject is so beclouded with commercial claims, trade names and arbitrary practice as that of lubrication. Considering that the subject is basic in the proper maintenance of industrial and other machinery, it is gratifying to have a sound approach to the subject presented.

The author devotes over a third of this volume in the discussion of lubricants themselves. In this discussion he deals with the chemistry of petroleum, methods of compounding and blending, tests and specifications, and characteristics of lubricating oils.

From there he goes to the principles of lubrication and methods of application. Then he takes up specific classes of machines, one at a time, until he has thoroughly covered the field. Among the many machine groups discussed are machine tools, steam engines, air compressors, pneumatic tools, reduction gears and gasoline engines. This information has been accumulated as a result of practical experience as recorded by investigators over many years of trial and error.

•

SALVAGE MANUAL FOR INDUSTRY—*Edited by seven engineers.* 250 *pages. Published by Technical Service Section, Industrial Salvage Branch, Salvage Division, War Production Board. Procurable through Superintendent of Documents, Government Printing Office, Washington, D. C.,* 50 *cents.*

A comprehensive practical manual on industrial salvage, containing systematically organized and classified information and data—most of it of a "how-to-do-it" nature—is available. Material is presented in 26 chapters, grouped into six major sections. There are two chapters on organizing and planning the salvage department; three on the administrative factors; twelve on methods of handling metal scrap; three on non-metallic waste; seven case histories demonstrating exemplary practice; a 17-page compilation of practical hints for handling specific waste materials and a 9-page index.

The well-illustrated volume was prepared and edited by an editorial board of practical industrial salvage engineers and business paper editors comprising the following: Editors, Robinson D. Bullard of The Bullard Company, and Fred P. Peters of *Metals and Alloys;* associate editors,

H. E. Blank, Jr., of *Modern Industry*, Arthur M. Perrin of National Conveyors Company, E. J. Tangerman of McGraw-Hill Publishing Company, and R. A. Wheeler of The International Nickel Company, Inc.; managing editor, John O. Emerson of the Industrial Salvage Branch, WPB. Assisting the editors, either with direct contributions or advice, was a corpse of some 40 engineering or salvage experts.

The book has been described as a combination management manual and technical guide for salvage operations which will have continued application in postwar industry.

SIXTY YEARS AGO

(From the February 9 and 16, 1884 Issues of AMERICAN MACHINIST)

Iron Locomotive Cab

The Grant Locomotive Works, Paterson, N. J., are building a small locomotive of the Forney type for the Rensselaer Iron Works, which will have a novelty in the shape of an iron cab. The cab is built in the ordinary style, with a rounded top which is seven feet above the deck of the engine. The material used is ⅛-in. sheet iron, which is bound by small angle iron. The windows and doors are large and are secured by neatly fitted iron fastenings. In appearance this cab does not differ materially from the ordinary wooden one, except that the moldings are absent.

The Grant Works are turning out some heavy consolidation engines for the New York, Pennsylvania and Ohio Railroad. Business is so slack that the working hours have been reduced to eight hours a day.

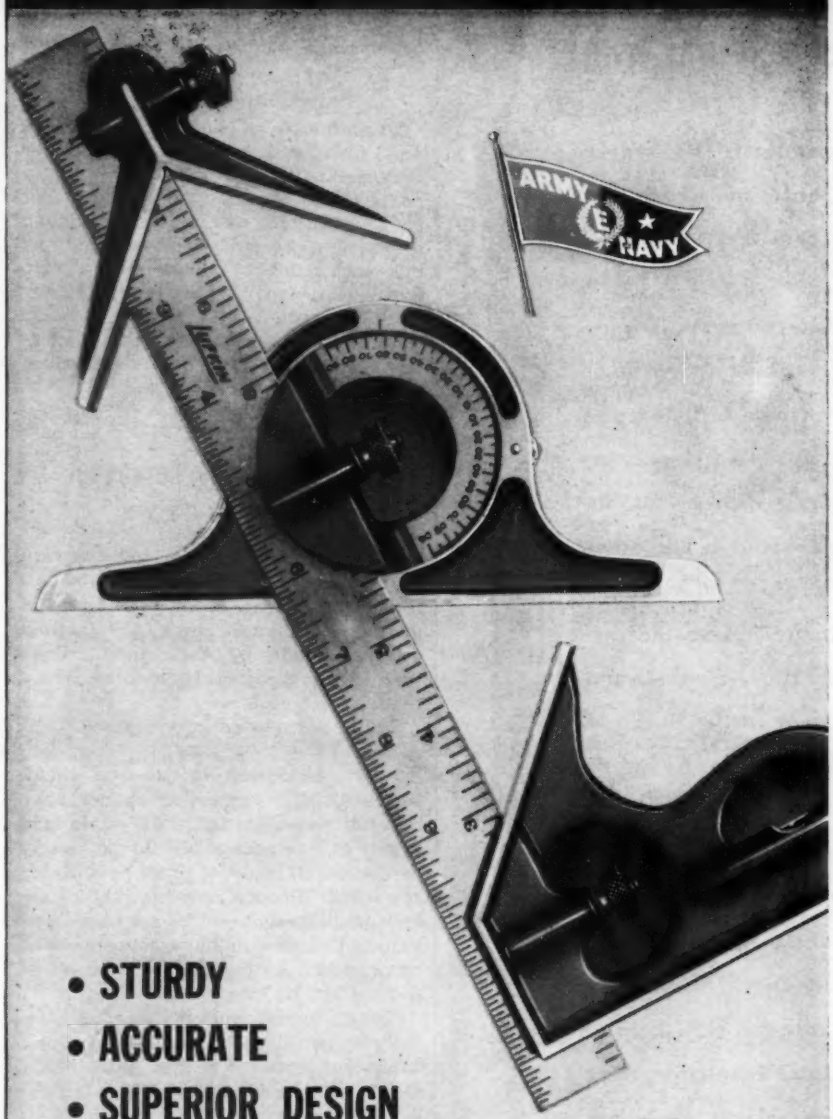
There's Million in it!

A "felt want" in mechanical practice is the means of finishing a tap after it has been hardened. Many attempts have been made to perform this feat, but thus far without success. The Pratt & Whitney Company experimented a good deal with the diamond for cutting hardened thread gages, but it did not answer. The diamond could be made to scratch, but when an attempt was made to produce a distinct cut it was a failure. Any one who can hit upon a method of cutting hardened taps will strike something that has "millions in it," and he will perform a real service.

Leather Car Wheels

A French inventor has devised a method of making car wheels from hides, and a manufacturer has tried the process and found it successful. Untanned buffalo hides are used. They are cut into strips and built up into a disk, which is made solid by heavy hydraulic pressure. The body thus

LUFKIN COMBINATION SET



• STURDY
• ACCURATE
• SUPERIOR DESIGN

Today's war production demands precision tools that get correct results—fast. And that's where Lufkin combination sets come in. The combination set shown here is sturdy, accurate and well balanced—it's the kind of tool every first class mechanic wants. For more information on this and all other Lufkin superior quality precision tools, write for free catalog 7.

BUY THROUGH YOUR DISTRIBUTOR

LUFKIN

SAGINAW, MICHIGAN · NEW YORK CITY
TAPES · RULES · PRECISION TOOLS

IS A SPIRAL, TOO!

Standard the world over for more than half a century, "Yankee" Spiral Ratchet Screw Drivers are now helping to product a tornado of ordnance to flatten the Axis. Simple, compact, strong, and ingenious, they and other "Yankee" Fine Mechanics' Tools are saving time, trouble, and money in the Battle of Production. At war's end, of course, they will again be available where and when you want to buy them . . . and they'll have new war-tested skill behind them. Meanwhile, treat them right. Tools are weapons of war.

"YANKEE" SPIRAL SCREW DRIVER NO. 130A
A Size for Every Purpose

Order from your supply house, or write North Bros. Mfg. Co., Dept. AM-244, Phila., Pa. Furnish priority ratings whenever possible, and every effort will be made to fill your orders.

"YANKEE" TOOLS
make good mechanics better
North Bros. Mfg. Co., Phila. 33, U. S. A.
Established 1880

formed is turned slightly larger than the tire, into which it is forced by pressure. This process of making car wheels is not greatly different from the plan followed in preparing paper wheels. The hides would be much more costly than paper, and we do not see how material of that kind would be any better adapted for a wheel center than compressed paper pulp.

Protesting Cheap Labor

The practice of some of our miners and iron makers of bringing over Hungarian and pauper labor under contract is contrary to the spirit of our institutions, and unless something is done to check it, demoralization of our whole labor market will result. Many men are working at the heavy labor connected with mining for less than a dollar a day, and yet a continual struggle is being made to reduce this pittance.

Bits Regarding Personnel

BY FRED H. COLVIN

Don't let your foremen get the idea that you expect them to furnish all the bright ideas from their departments. This tempts them to claim suggestions made by their men. Urge them to encourage their men by giving them full credit.

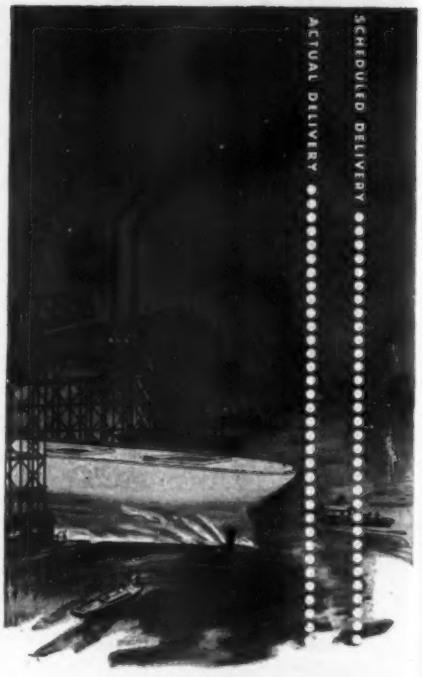
Suggestion boxes produce excellent results when they are properly conducted. But they do not run themselves. Every suggestion should have careful consideration. If it is not practical, the reason should be clearly explained. If good, it must be suitably rewarded. Proper rewards require excellent judgment as to adoption and value. Unless you have someone who can conduct a suggestion box properly, don't start it!

Pick your personnel manager as carefully as you do your production superintendent. He may be just as valuable. Don't get the idea that it's a job for a man, or woman, who has failed at everything else. It's a real job and can be made to pay real dividends.

Have your application blanks short and don't ask questions that are none of your business anyhow. You'd be peeved as a pup at a lot of questions a man looking for a job is supposed to answer. You may need his production just as much as he needs a job so don't antagonize him.

In the days of the small shop the boss knew his men's first names and when Johnny or Susie had the measles. A turkey plus a handshake at Christmas meant a lot to the men. In big shops the personnel man has to represent the boss. See that he does it well. And the more often the big boss can get out into the shop, the better.

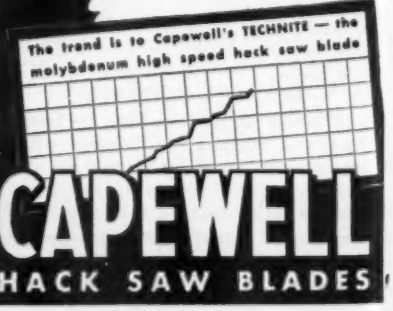
Don't expect that your foreman will never make mistakes. If they were that good they'd probably have your job.

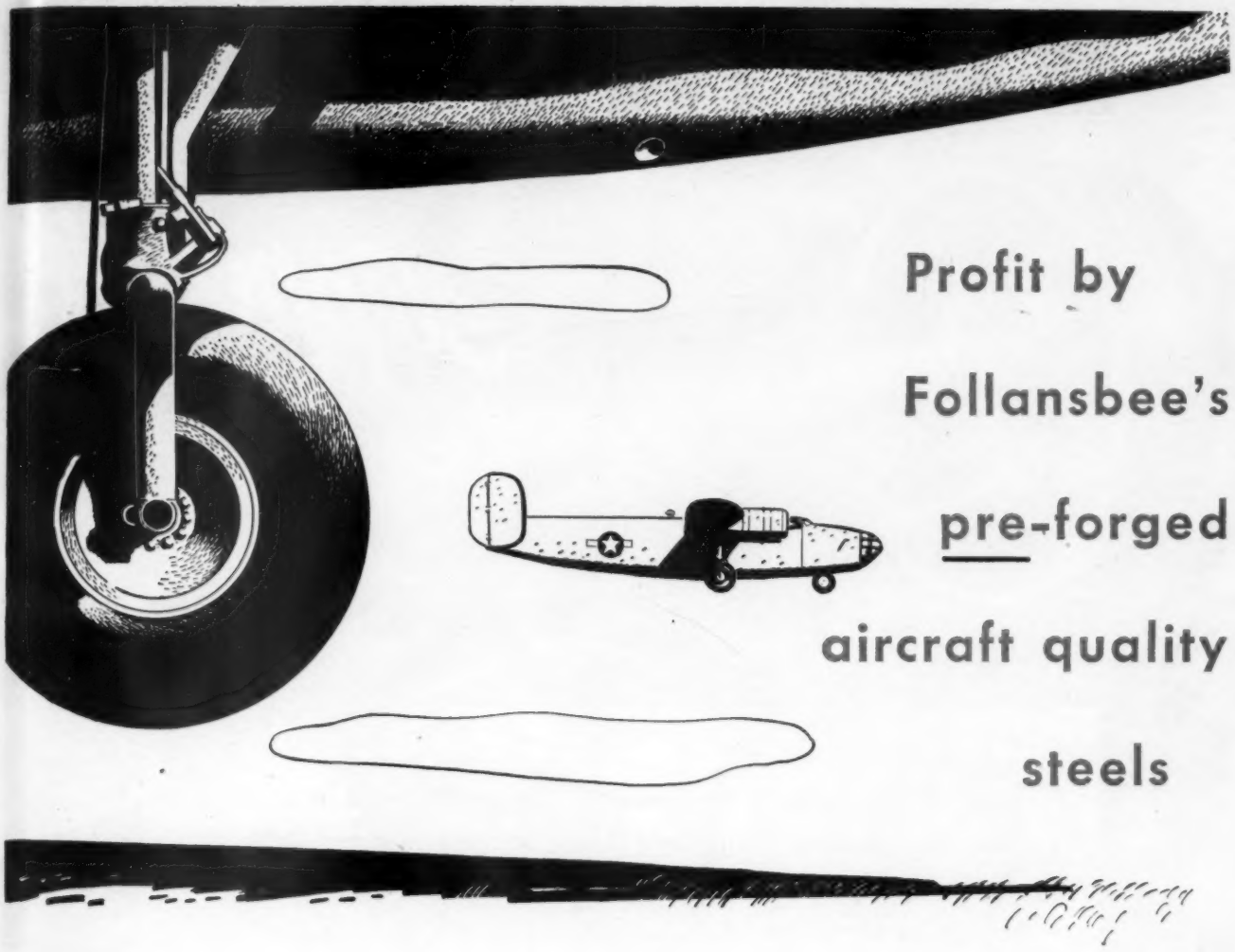


CAPEWELL
HACK SAW BLADES
HELP BEAT SHIPYARD SCHEDULES

At one important shipyard, which is outrunning production schedules, the machine shop switched to Capewell's Technite hack saw blades. Now the mechanics report the Capewell blades cut longer than any tried previously. Have you investigated to learn whether Capewell hack saw blades can cut time and costs for you?

THE CAPEWELL MFG. CO.
HARTFORD, 2, CONN.





Profit by Follansbee's pre-forged aircraft quality steels

An important aircraft equipment manufacturer says, "Our tests show your steel to be the highest quality for aircraft service . . . we are approving your basic open hearth steel, aircraft quality, as an alternate for standard electric furnace steel of aircraft quality."

Follansbee alloy steels are winning such recognition through the exclusive PRE-Forging process—the pressing of ingots into blooms or billets, resulting in a more homogeneous structure than rolling can impart. Small basic open hearth furnaces under close, skillful control is another important factor.

For the tough jobs of today and tomorrow which call for high quality alloy steels, you can profit by specifying Follansbee PRE-Forged steel.

FOLLANSBEE STEEL CORPORATION

GENERAL OFFICES • PITTSBURGH 30, PA.

Sales Offices—New York, Rochester, Cleveland, Detroit, Milwaukee. *Sales Agents*—Chicago, St. Louis, Nashville, Los Angeles; Toronto and Montreal, Canada. *Plants*—Toronto, Ohio and Follansbee, W. Va.

ALLOY BLOOMS, BILLETS, BARS, SHEETS & STRIP • COLD ROLLED SHEETS & STRIP
POLISHED BLUE SHEETS • ELECTRICAL SHEETS & STRIP • SEAMLESS TERNE ROLL ROOFING

BORING stepped up

Yes, they are boring gun barrels 84% faster since this large producer of ordnance changed to Tycol 655 Sulphurized Cutting Oil. This modern cutting oil is being used with tungsten carbide boring tips for the machining of many gun barrels in sizes up to 14 inches. Not only does this user get greater output, but the finishes are better and boring is more accurate because Tycol 655 has *eliminated excess build up on tool cutting edges* . . . there is *no gumming, no rancidity, no tarnishing of machined parts.*

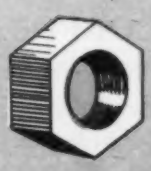
Many cutting operations from tapping nuts to boring heavy guns are being speeded by these modern Tycol cutting oils. Engineering assistance is yours for the asking. Write to Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

DRUMS! DRUMS! DRUMS!

War needs make it extremely important that all empty drums be returned immediately

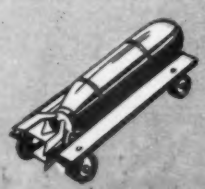
Finer Finishes

Finer finishes obtained with Tycol cutting oils are exemplified by one big eastern ordnance manufacturer in the cylindrical and centerless grinding of shells, and he did this with a 40 to 1 mix, or half the concentration previously required.



Longer Tool Life

Longer tool life to the tune of 1,181% increase in taps per grind was obtained when this manufacturer switched to Tycol Soluble Oil. The taps now tap 2,480,000 nuts as compared with the 210,000 before using Tycol.



Faster Cutting

with Tycol cutting oil creased the boring of shells from 4 to 22 betw tool grindings. This m rially increased product and saved many man ho

TIDE WATER ASSOCIATED OIL COMPANY

MAKERS OF THE FAMOUS VEEDOL MOTOR OIL

Eastern Division: 17 Battery Place, New York 4, N. Y.

PRINCIPAL BRANCH OFFICES: BOSTON • PHILADELPHIA • PITTSBURGH • CHARLOTTE, N. C.

TIDE WATER OIL COMPANY OF CANADA, LTD • Toronto – Montreal

ACCURACY PLUS

American victory on the production line is necessary to Allied victory on the firing line. H-W Semi-Automatic Thread Milling Machines are winning production victories . . . by saving precious time in thread production . . . by minimizing spoilage . . . by securing highest precision on difficult work. The H-W Milling Process employs multiple cutters that finish threads in one revolution . . . producing internal, external or taper threads . . . right or left hand . . . with equal speed, facility and precision. If you have a threading problem, write or wire . . .

ARMY E NAVY

THE HANSON WHITNEY MACHINE CO.

HARTFORD CONNECTICUT U.S.A

HITTING THE HIGH SPOTS

WHEN this 14-foot 38-ton flywheel starts turning up 500 rpm's, the first integrated steel mill on the Pacific Coast will be in operation . . . an interesting wartime development.

An equally outstanding war development is the greatly increased cutting-tool life which war plants everywhere are getting, by using *Texaco Cutting Coolants.*

For example, in producing bomb fin liners, a certain forming tool required sharpening every 8 to 10 hours. Changing to Texaco, the tool now averages 50 hours between grinds.

So effective have Texaco lubricants proved that they are definitely preferred in many fields, a few of which are listed at the right.

Texaco Lubrication Engineering Service is available to you through more than 2300 distributing points in the 48 States.

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

TEXACO

TEXACO CUTTING, SOLUBLE AND HYDRAULIC OILS FOR FASTER MACHINING

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

"Now all we need is a Good Contract Manufacturer

...BUT WHERE'S ONE* TODAY WITH THE CAPACITY AND KNOW-HOW FOR THIS JOB?"

IF you're up against it for manufacturing capacity to produce a badly needed part, machine, or mechanism . . . then wrap up your headache and *Take It To Taft-Peirce.* Here, in the Contract Division, your production requirements will be filled promptly and economically . . . exactly according to your blueprints, specifications, or models . . . regardless of whether your order calls for a single piece or quantity lots.

For here, in this unique organization, you will find a collateral fund of experience in the manufacturing practices of your own industry . . . because there is *no* industry which has not brought its problems to Taft-Peirce. So there is no delay in getting down to brass tacks on any assignment.

Examples of work done, and of the men and machines which do it, are shown in an interesting picture-and-caption book which you may have for the asking. Simply write, on your letterhead, to *The Taft-Peirce Mfg. Co., Woonsocket, R. I.,* for a copy of the publication entitled:

***TAKE IT TO TAFT-PEIRCE**

HERE'S THE STORY...

FACTS AND FIGURES TO SOLVE YOUR SPEED VARIATION PROBLEMS

THE DIRECT CURRENT UNI-SHELL MOTOR

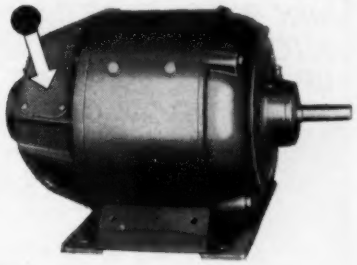
Completely modern, the new Robbins & Myers Uni-Shell Direct Current Motors combine ease of commutator and brush inspection with maximum mechanical protection. In performance, too, they offer real protection against high maintenance costs and time-wasting delays. All types, whether shunt or compound-wound, contain interpoles that assure long, trouble-free operation with good commutation and minimum brush and commutator wear.

In addition, you can enjoy the benefits of flexible mounting provided by Uni-Shell interchangeability. Shell length, diameter, base mounting holes, shaft dimensions, height of shaft above base, head fit, and bolt circle mounting for heads are exactly the same on these d.c. motors as on the a.c. types.

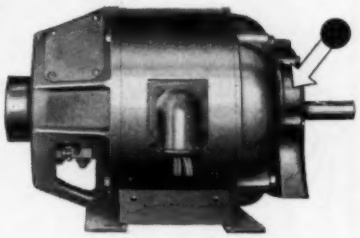
Get all the facts on profitable, protected d.c. motor application by asking for your free copy of the new, helpful, 20-page Uni-Shell Motors booklet, today.

ROBBINS & MYERS • INC.
MOTOR DIVISION, SPRINGFIELD, OHIO
HOISTS & CRANES • MACHINE DRIVES • FANS • MOYNO PUMPS • FOUNDED 1878

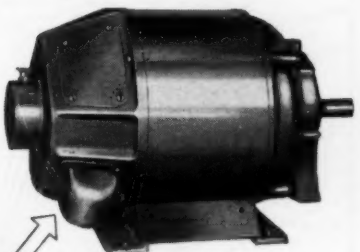
SHIPMENT NOW!
Ample stock on all types of integral motors on hand as this goes to press. Wire or phone your inquiry.



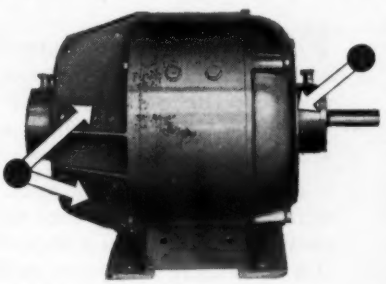
● **Open-type motor end head design guards against falling foreign material.**



● **Protected open-type made drip-proof by addition of cover plate to shaft-extension end of motor.**



● **Drip-proof type made splash-proof, too, by protective covers on bottom of end head.**



● **Totally enclosed type without ventilating openings in shaft-extension end head . . . plates on commutator end head cover both top and bottom openings.**

It's Free!

MAIL THIS COUPON NOW!

AM11

ROBBINS & MYERS, INC., Motor Division, Springfield, Ohio

Please send my free copy of the new, informative Uni-Shell Motors booklet.

Name.....*Dept*.....
Company.....
Address.....
City.....*State*.....

I would ☐ would not ☐ like to talk to a representative.

"A FILE OF QUALITY IS A JOY FOREVER," SAYS POP

IT'S KINDA TOUCHIN', AIN'T IT--TH' WAY POP FONDLES THEM NEW *NICHOLSONS?!*.. I WAS BRUNG UP TA TAKE *CARE* OF TOOLS, BUT I NEVER *CARESSED* 'EM!
TH' GUY THAT ABUSES ONE OF THEM FILES KIN SAVE EV'RYBODY A LOT OF TROUBLE BY JUST GOIN' OUT AN' BURYIN' HISSELF!
POP'D RUTHER DROOL OVER A BATCH O' *NICHOLSON* FILES THAN ATTEND A NECKTIE PARTY FOR HITLER..
ALEXANDER

"POP"—lovable character of the popular series of Nicholson cartoon advertisements—portrays the philosophy of the foreman who is always thinking of high efficiency and wise economy in shop practices and routine.

He is convinced that good production begins with good tools; and that their proper use and proper care are equally important. He personifies the Nicholson viewpoint in all these directions.

Nicholson and Black Diamond Files are made under the highest standards of design and quality 79 years of file-making experience has been able to attain. And so consistently does Nicholson maintain those standards that *Twelve perfect files in every dozen* is the sweeping Nicholson guarantee.

Following up the service of quality manufacture, Nicholson endeavors to aid every purchaser in getting the most out of these famous files. One form of assistance is a book of 48 interesting, illustrated pages entitled—

"FILE FILOSOPHY" Tens of thousands of copies of this book (which has gone through many printings) are in the hands of purchasing and production heads, shop foremen and key mechanics. Write for copies (*how many?*) for the interested men in your organization. *FREE.*

NICHOLSON FILE COMPANY, 29 ACORN ST., PROVIDENCE 1, R. I., U. S. A.

(Also Canadian Plant, Port Hope, Ont.)

NICHOLSON FILES

FOR EVERY PURPOSE

NICHOLSON U.S.A. MADE IN U. S. A.

DOWMETAL *magnesium products*

THE METAL OF MOTION

ANOTHER DOW SERVICE—SHEET, PLATE AND STRIP

LIGHT WEIGHT *PLUS* STRENGTH PROVIDED BY DOWMETAL PRODUCTS

● Sweeping over America today, goes a new challenge to dead weight. More than ever before, every ounce added to a product must earn its own way. For we're growing weight conscious—*pay load conscious.*

In many jobs this calls for Dowmetal Magnesium Alloys. We can help you use the lightest of the structural metals—placing at your disposal 27 years experience plus large fabrication facilities.

An important Dow Service is the production of sheet, plate and strip. We can produce in all gauges—.020 inches and thicker. These magnesium products are easily fabricated into many shapes. They possess the same high-strength weight ratio characteristic of other forms.

We can also tell you how to weld, form and assemble magnesium. If you have a place for "the metal of motion" —call on us. We'll be glad to help.

MAGNESIUM DIVISION

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle

PITTSBURGH SEAMLESS
FORMED TO ORDER

Pittsburgh Seamless Steel Tubing . . . in carbon, alloy or stainless grades . . . may be readily formed, within accepted limits of the steel, to meet today's manufacturing and production needs.

Pittsburgh Steel Company is equipped to fill many of these forming requirements to order.

If your uses of seamless tubing involve swaging, upsetting, expanding, tapering, flanging, bending or other forming, either hot or cold, you may often speed production by ordering tubing in these more finished shapes.

Send us your blue-prints and specifications for analysis and quotation.

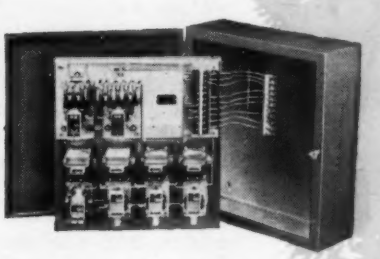
PITTSBURGH STEEL COMPANY
1651 GRANT BUILDING PITTSBURGH, PA.

Pittsburgh Seamless STEEL TUBING

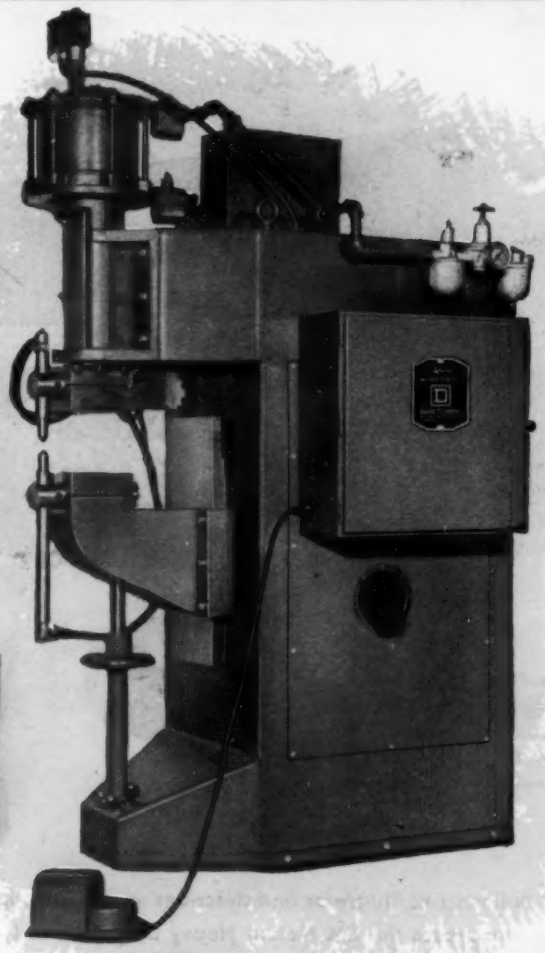
MORE PRODUCTION WITH LESS OPERATOR SKILL *when resistance welders have* SQUARE D *Automatic* CONTROL

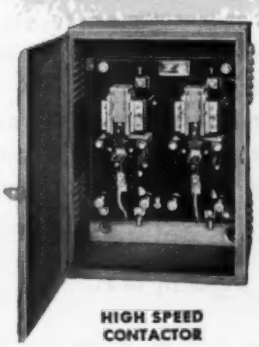
• Consistently good resistance welding at high production rates requires automatic control of pressure and current in an accurately regulated sequence. Square D welder control meets those requirements—exactly. It is simply designed, easy to install and maintain. With Square D automatic control on the job, very little operator skill is required—a vital angle during today's scarcity of skilled manpower.

Specify Safront timers and Syncro-Break or High Speed contactors on new welding machines. Or, if increased quality and production is needed from present machines, find out how easily they can be equipped with automatic control. Consult your nearest Square D Field Engineer.

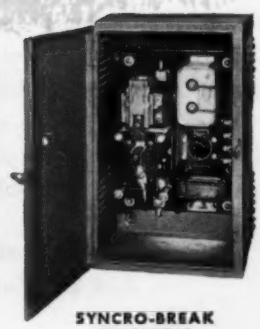


SAFRONT TIMERS (above) are built in 18 NEMA standard types. Notice, in upper left photo, how all electrically energized parts are behind a protective panel, yet calibrated timer adjustments are accessible on panel front. Separate timing devices, provided for each step of the welding cycle, are individually adjustable from 3 to 100 cycles. Safront interiors "swing out" (upper right photo) to expose operating parts.





HIGH SPEED CONTACTOR



SYNCRO-BREAK CONTACTOR

HIGH SPEED AND SYNCRO-BREAK CONTACTORS (right) possess unusual design features necessary for frequent making and breaking of the welding transformer primary circuit. The Syncro-Break design includes means for opening circuit without arcing at contact tips, thus increasing contact life and allowable ratings.

ELECTRICAL EQUIPMENT • KOLLSMAN AIRCRAFT INSTRUMENTS

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

CM METEOR

Here is the Subtractor of Materials Handling Costs

Capacities from ½ ton and up. Lifting speeds from 18 to 60 feet per minute... Low headroom. Hook suspension, plain, geared or motor driven trolley.

CM Bulletin 142 illustrates and describes every operating feature that makes the CM Meteor Heavy Duty Electric Hoist an outstanding production time-saver... cutting deep into materials handling costs. Helical gears, aeroplane cooling, low headroom, safety limit brake, simplified maintenance... these and other advantages are explained in terms of operating efficiency and service life. Various types trolleys and accessory equipment, lift and speed tables, dimensions, etc., are included.

We invite you to write today.
Just ask for Bulletin 142.

CHISHOLM-MOORE
HOIST CORPORATION

(Affiliated with Columbus-McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: 128 Fremont Ave., TONAWANDA, N.Y.

SALES OFFICES: New York, Chicago and Cleveland

STEEL
MOST VERSATILE OF METALS IS LIMITED ONLY BY MAN'S INGENUITY . . . .

Thomas Strip
COLD ROLLED STRIP STEEL

Stimulates Production Economies

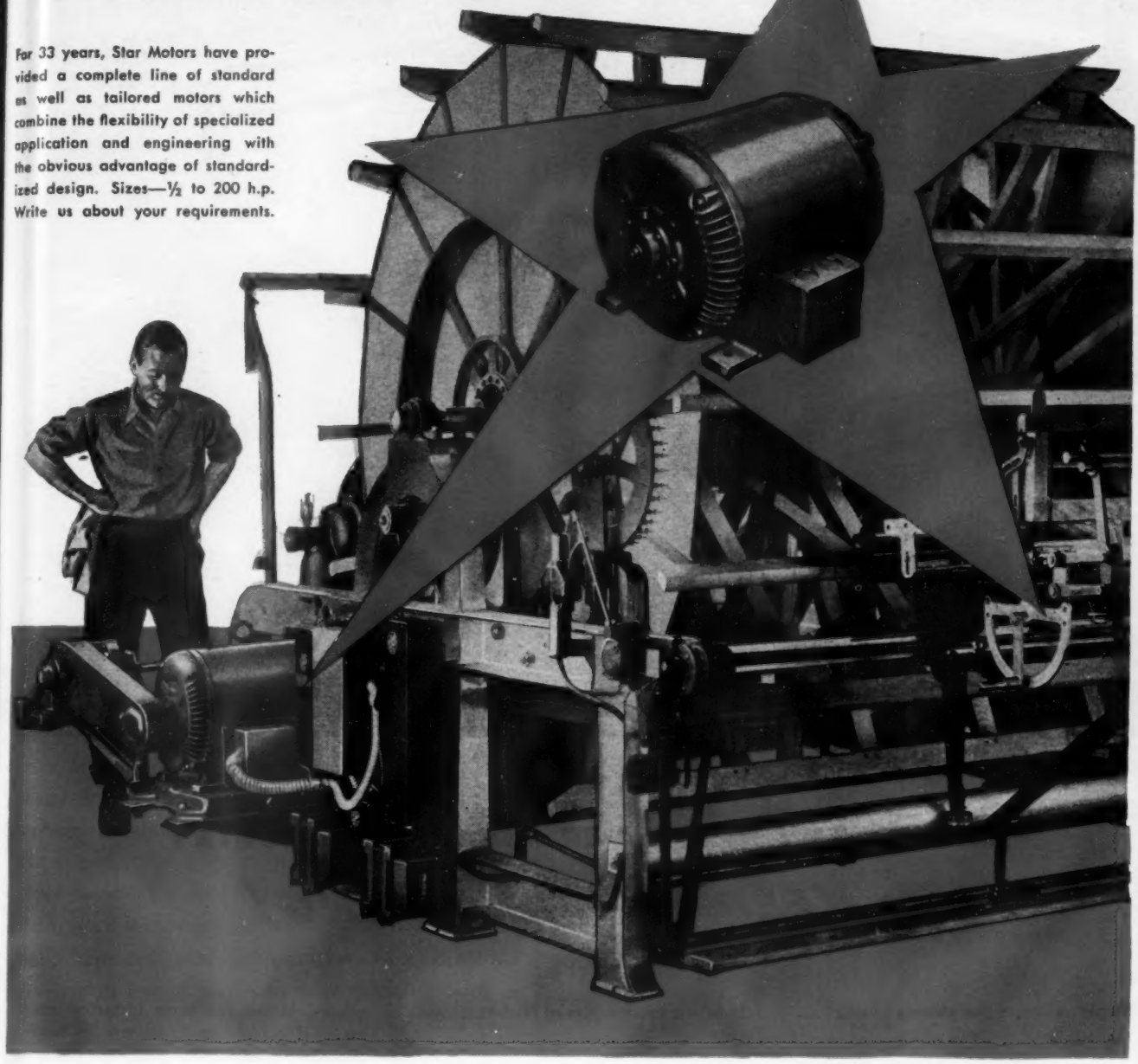
One single cold rolled strip steel quality developed for you by Thomas engineers might easily result in furthering your production economy. Or, perhaps it will require a combination of Thomastrip features to provide the steel which is "just right." But, regardless of whether it requires one or a combination of the following features—accurate gauges, finishes for painting and plating, uniform tempers ranging from dead soft to hard, special edges, non-scalloping deep drawing qualities, low and high carbon content, fine grain for special requirements, and variety of non-ferrous and lacquer finishes—Thomas has the facilities to provide them for you. Therefore, call in Thomas engineers to check with you on your problem.

BRIGHT FINISH NOT COATED, SOLDER COATED, ELECTRO-COATED WITH NICKEL, ZINC, COPPER, BRASS, AND LACQUER COATED—IN COLORS

THE THOMAS STEEL CO. • WARREN, OHIO

IN THE TIGHT SPOTS IT'S A STAR

For 33 years, Star Motors have provided a complete line of standard as well as tailored motors which combine the flexibility of specialized application and engineering with the obvious advantage of standardized design. Sizes—½ to 200 h.p. Write us about your requirements.

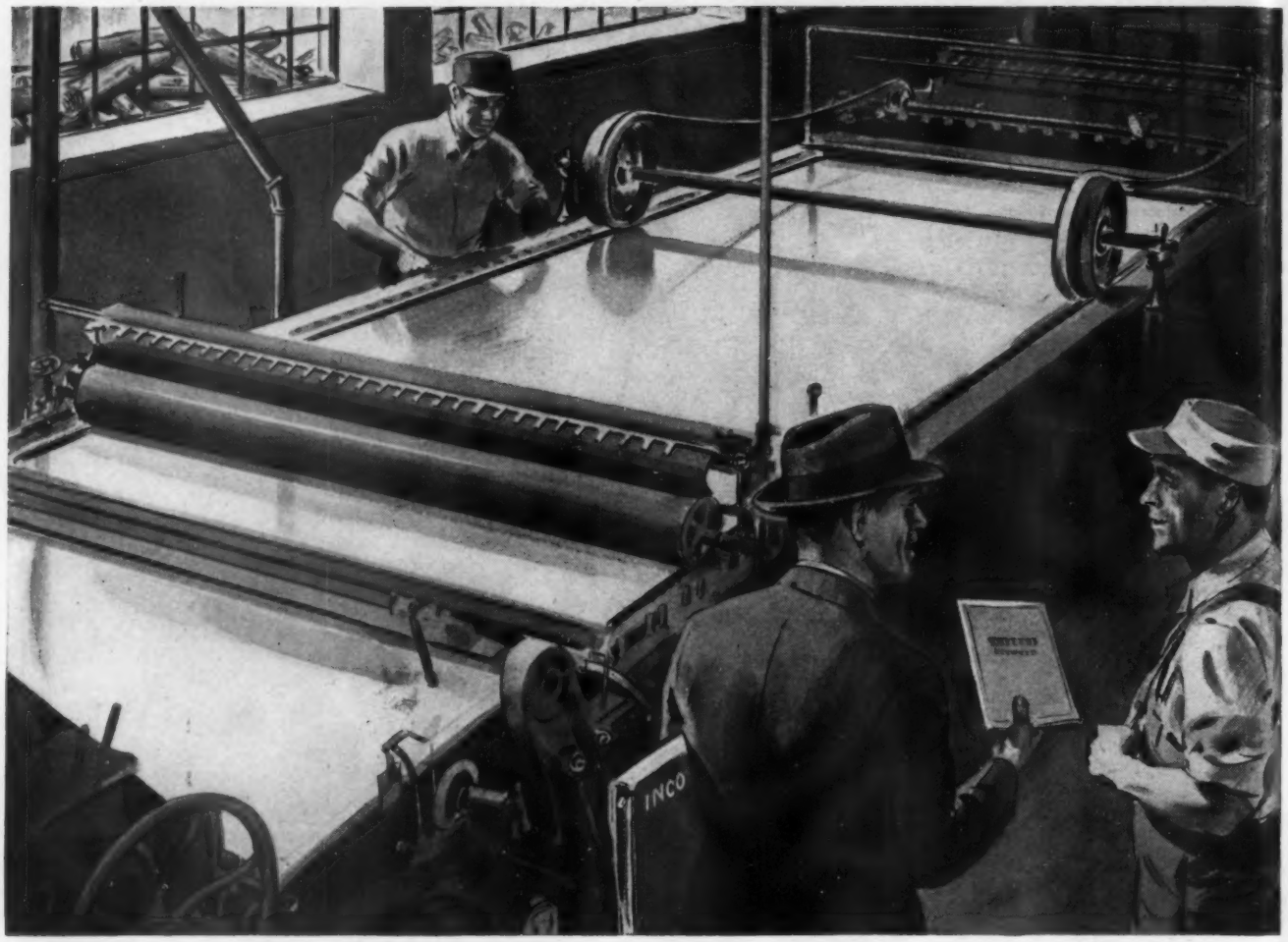


Frequently Star is asked to fit *mechanical* "tight spots" with its unique welded construction that eliminates special patterns and castings. And just as often to fit engineering "tight spots." Sipp-Eastwood warping machines, for example, warp 500 yards of rayon, acetate or nylon a minute. To meet these high speeds, Star engineering provides motors that develop intermediate speeds in addition to the four fundamental speeds. Abnormally high torque is also provided at low speed. And all without special or costly construction. STAR ELECTRIC MOTOR CO., Bloomfield, N. J.

ARMY E NAVY

POWER **PACKAGED** *AS YOU NEED IT*

STAR MOTORS



NICKEL AIDS THE PAPER AND PULP INDUSTRY

to KEEP 'EM PRODUCING!

"Paper is one of the sinews of war" . . .

A basic tool of communication . . . strategic substitute for metal in many products.

Made, for example, into new export containers that protect their contents against water, vapor, and grease, it's a vital factor in the Battle of Supply.

So the need is tremendous . . .

And the industry's vast output is possible largely because paper-making is almost entirely a machine process.

Plant engineers agree that when you depend so much on machinery, you'd better have machines that are dependable.

That is why . . . thanks to those engineers and the machine designers . . . equipment in paper and pulp mills includes large amounts of Nickel alloyed materials.

Metals so fortified help a lot to keep machines producing, because Nickel imparts toughness . . . strength . . . corrosion resistance.

Thus, when properly used in critical parts, "a little Nickel goes a long way" toward increasing dependability.

From grinder cylinders to dryer rolls, from digesters and save-all pans to Fourdrinier rails and beams, Nickel alloyed parts stand up better to abrasion, wear, and corrosive chemicals.

We have long enjoyed the privilege of cooperating with technical men interested in the selection, fabrication, and heat treatment of metals . . . not only in the paper industry but in many others. Whatever *your* industry may be . . . if you'd like to have such assistance . . . counsel and printed data are available on request.

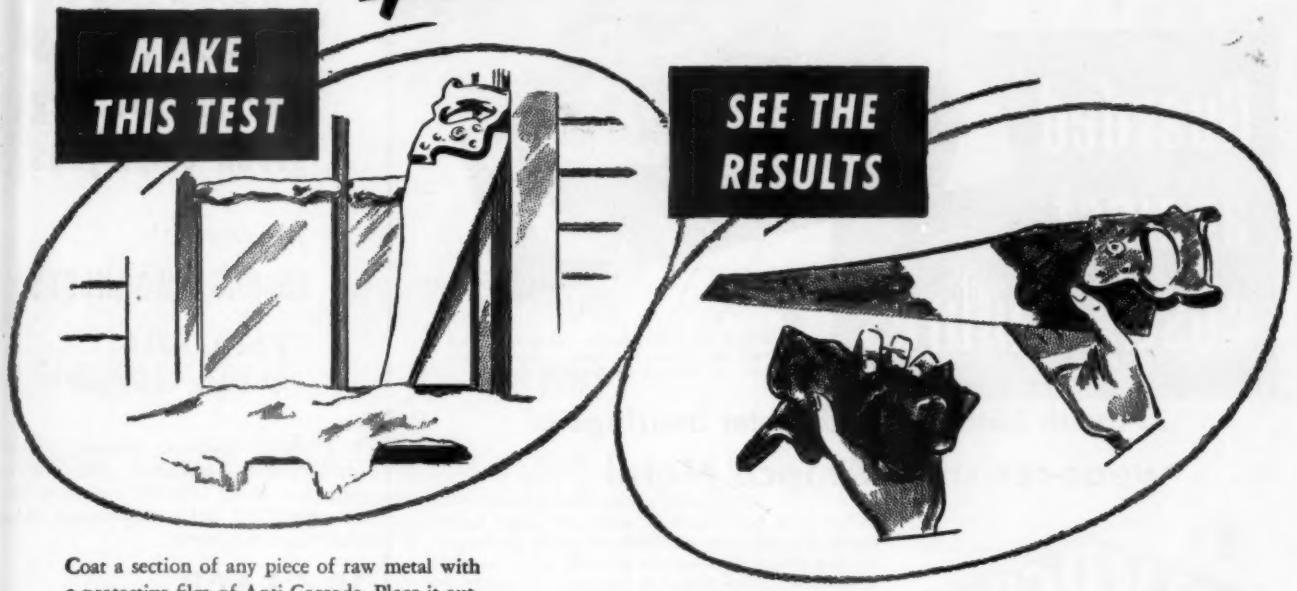
New Catalog Index

New Catalog C makes it easy for you to get Nickel literature. It gives you capsule synopses of booklets and bulletins on a wide variety of subjects — from industrial applications to metallurgical data and working instructions. Why not send for your copy of Catalog C today?

* *Nickel* *

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York 5, N. Y.*

How to *prevent* Corrosion



Coat a section of any piece of raw metal with a protective film of Anti-Corrode. Place it out-of-doors, and leave exposed to the elements.

Rain, snow, changing temperature, dust and grime have eaten into and oxidized the unprotected metal. But note surface under Anti-Corrode film—bright and unharmed, in its original state.

CITIES SERVICE ANTI-CORRODE is a safe rust and corrosion preventive that brings amazing results. It is a reliable safeguard against corrosion of metals in any form or state of finish—whether in storage or in transit. Anti-Corrode forms a tenacious, durable film that is impervious to moisture and the more common gases prevalent in the atmosphere. And, since it contains lubricating material, it need not be removed in drawing operations. Anti-Corrode is made in several grades to meet specific requirements and severest tests. It is economical, easy to apply and can be removed with kerosene or any petroleum solvent.

This TEAM Will Save You Money and Materials

Recently, we announced the development of Cities Service Rust Remover, and responses to the demonstration offer far exceeded our expectations. Rust Remover, of course, *removes* rust. Anti-Corrode is designed to *prevent* rust and corrosion. Together, they will safeguard your equipment and war production—for the duration!

Take advantage of this FREE ANTI-CORRODE demonstration offer
Mail this coupon today!

(Available only in Cities Service marketing territory EAST of the Rockies.)

CITIES SERVICE OIL COMPANY
NEW YORK · CHICAGO
IN THE LOWER
ARKANSAS FUEL OIL COMPANY
SHREVEPORT, LA.

CITIES SERVICE OIL COMPANY
Room 122, Sixty Wall Tower, New York 5, New York

Gentlemen: I would like to test Anti-Corrode on my own equipment FREE OF CHARGE. Please send me the details.

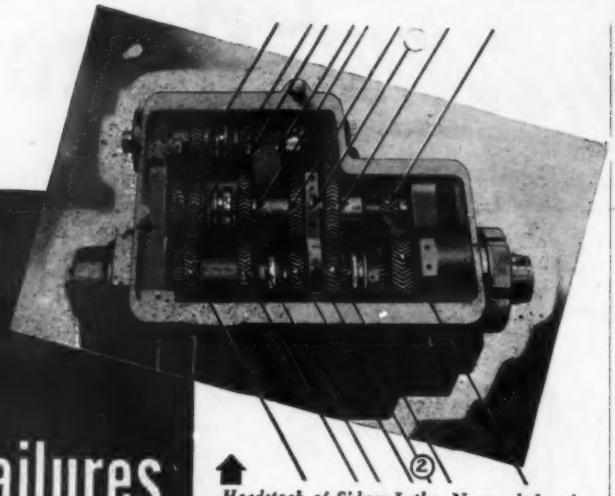
Name_____

Company_____

Address_____

City_____ State_____

Guarded against costly failures



Headstock of Sidney Lathe. Numerals 1 and 2 point to center bearings; other arrows indicate 14 Ampco bushings in the gears.

. . . with bushings and center bearings of wear-resisting Ampco Metal . . .

Reg. U. S. Pat. Off.

AMPCO Metal

The Metal without an Equal

When you buy machine tools or other heavy equipment, it pays to check for parts of Ampco — the metal that stands up and gives several times the life of ordinary bronzes. Adopted by 90-odd leading machine tool manufacturers. • Write for bulletins which will aid you as a buyer and user of machinery — or help you specifically with your design problems involving wear, corrosion, shock, or other severe conditions.

Ampco Metal, Inc.

Department AM-2 Milwaukee 4, Wisconsin

Atlas

COOLANT PUMPS

FOR ALL TYPES of MACHINE TOOLS

NEW LOW PRICES

$23.75 and up

Now equip every machine for higher production with a compact, portable Atlas Coolant Pump! Cuts tool wear, cuts finish rejections, lets operator concentrate full time on production. Two models, universal or induction motor, 450 and 225 GPH. Handle any cutting fluid, adjust from drip to stream. *Immediate* delivery! Send for complete information.

ATLAS PRESS COMPANY

204 N. PITCHER ST., KALAMAZOO 13D, MICH.

LATHES • DRILL PRESSES • ARBOR PRESSES • SHAPERS • MILLING MACHINES

HELP FOR PRODUCTION EXECUTIVES who are training green employees

•

Illustrated

16-PAGE BOOKLETS

"The TOOLS OF OUR TRADE"

• Practical training courses on elementary shop practice . . . designed to help you make efficient operators out of unskilled help. Reprinted from *American Machinist.*

10¢ EACH

(Slightly less in quantities over 500)

1 "The Tools of Our Trade"

2 "How to Run a Drilling Machine"

3 "How to Run a Milling Machine"

4 "How to Run an Engine Lathe"

5 "How to Run a Grinding Machine"

MAIL COUPON TODAY

Please send me at once the following special "Tools of Our Trade" sections from *American Machinist.* I inclose 10 cents (stamps, money order or check) for each section ordered.

1 2 3 4 5

(Order by circling number)

Name .....

Company .....

Address .....

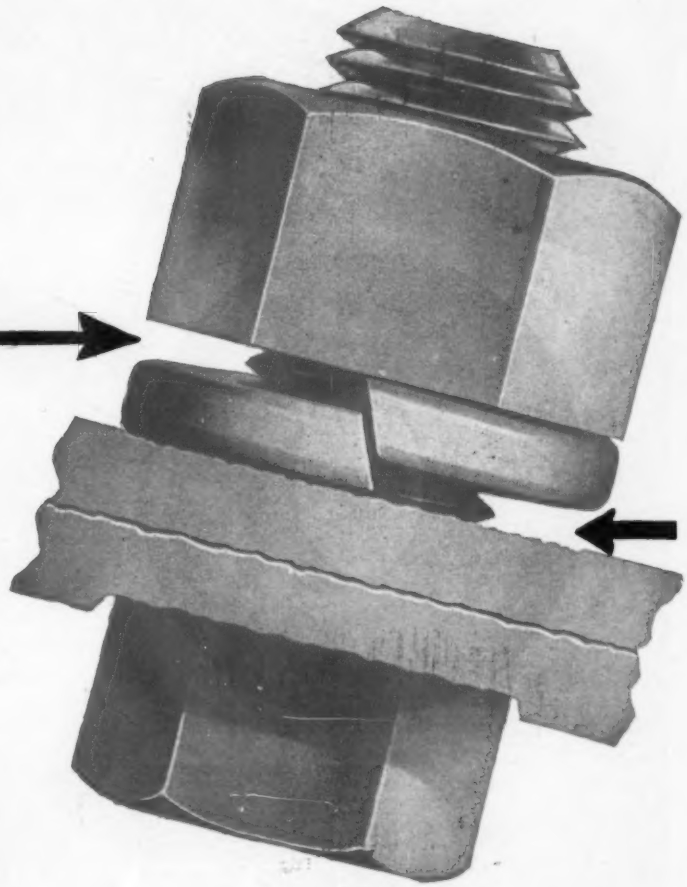
.....

AMERICAN MACHINIST

330 W. 42d St., New York 18, N. Y.

A little spring can't go a long way

So when you order spring washers specify the ones with long range of spring power



INSIST ON KANTLINKS—the big long-range spring washers that expand and compensate for inevitable wear of bolted parts.... There is no substitute as economical on any assembly that is subjected to vibration. Short-range multi-toothed washers that bite in can not give you the wide expansion range of Kantlinks' **spring power.**

Furthermore, Kantlinks should be used with **every** type of nut, whether a regular standard nut or any one of the many fixed or locked nuts. For even if the nut never budges on the bolt, all other parts of almost every bolted assembly loosen sooner or later **unless** an adequate size helical **spring** washer is used to hold every part tight.

The parts will loosen because of bolt stretch, and frictional wear of metal on metal, burrs and flares, and because of pulverizing of paint, scale, and rust.

This is war time—be safer with powerful Kantlinks.

Let us send you samples—send details of your application. Test and compare them on the same job with **any** type of nut, or with any other type of washer. Kantlinks can't lose a real test. Try them for efficiency, economy and real safety.

Write today for descriptive folder.

THE NATIONAL LOCK WASHER COMPANY
NEWARK, N. J., U. S. A.

KANTLINK TRADE MARK

the long-range Spring Washer

ON THE BATTLEFRONT • IN PRODUCTION OF WAR MATERIAL
AND IN INDUSTRY • FEDERAL BEARINGS ARE DOING THE SAME
FINE PRECISION JOB FOR WHICH THEY ARE NOTED • • •
FEDERAL
1308
MADE IN U.S.A.

FEDERAL BEARINGS

TRADE MARK

THE FEDERAL BEARINGS CO., INC.

Makers of Fine Ball Bearings

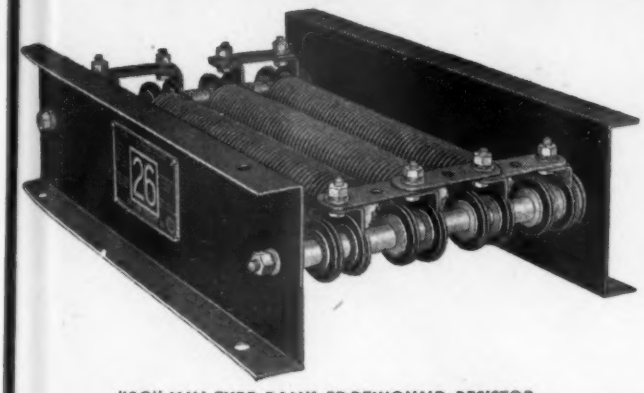
U. S. A.

REPRESENTATIVES LOCATED AT

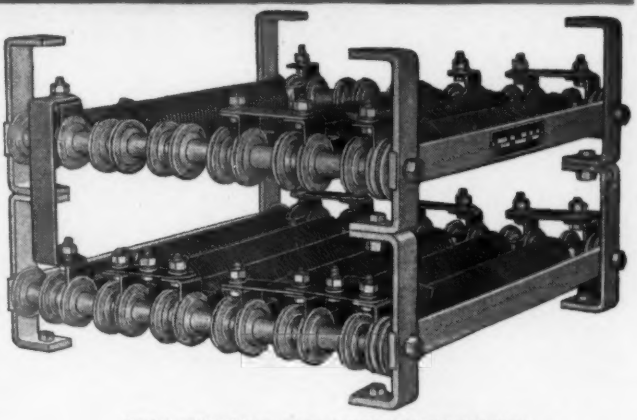
Detroit: 2640 Book Tower • Cleveland: 402 Swetland Building

Chicago: 902 S. Wabash Ave. • Los Angeles: 5410 Wilshire Blvd.

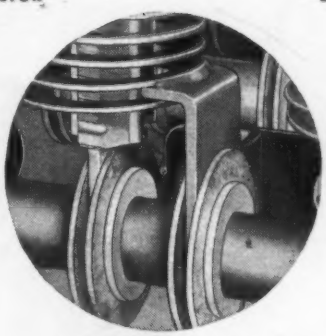
"3C" EDGEWOUND RESISTORS STAND ABUSE



"3C" MILL TYPE BANK EDGEWOUND RESISTOR



"3C" STANDARD TYPE BANK CONSTRUCTION



WELDED END TERMINAL

Severe shock, vibration, and rough usage don't bother "3C" Edgewound Resistors.

They're built to take it! Corrosion resistant special alloy ribbon is wound on edge, and supported on steel reinforced Porcelain Insulators.

The grooved Insulators hold the turns of ribbon in place. Should breakage occur, the cage form of the resistor ribbon holds the pieces in place, thus maintaining insulation characteristics.

Standard banks, consisting of units supported on insulated steel rods, which are supported by steel end brackets, and protected by side straps, provide sturdy construction.

The Mill Type Bank has similar individual units supported between sections of steel channel.

Both banks provide full mechanical strength to prevent sagging of resistor ribbon due to temperature, thus eliminating any mechanical strain on the ribbon.

Welded End Terminals are supplied as standard in both types of Banks. « « « «

ASK FOR FULLY DESCRIPTIVE BULLETIN 110

CONTINUE TO ROLL WITH CLARK CONTROL

THE CLARK CONTROLLER CO.

1146 EAST 152ND ST. CLEVELAND, 10, OHIO

This Tireless Watch-dog Prevents Motor Burnouts

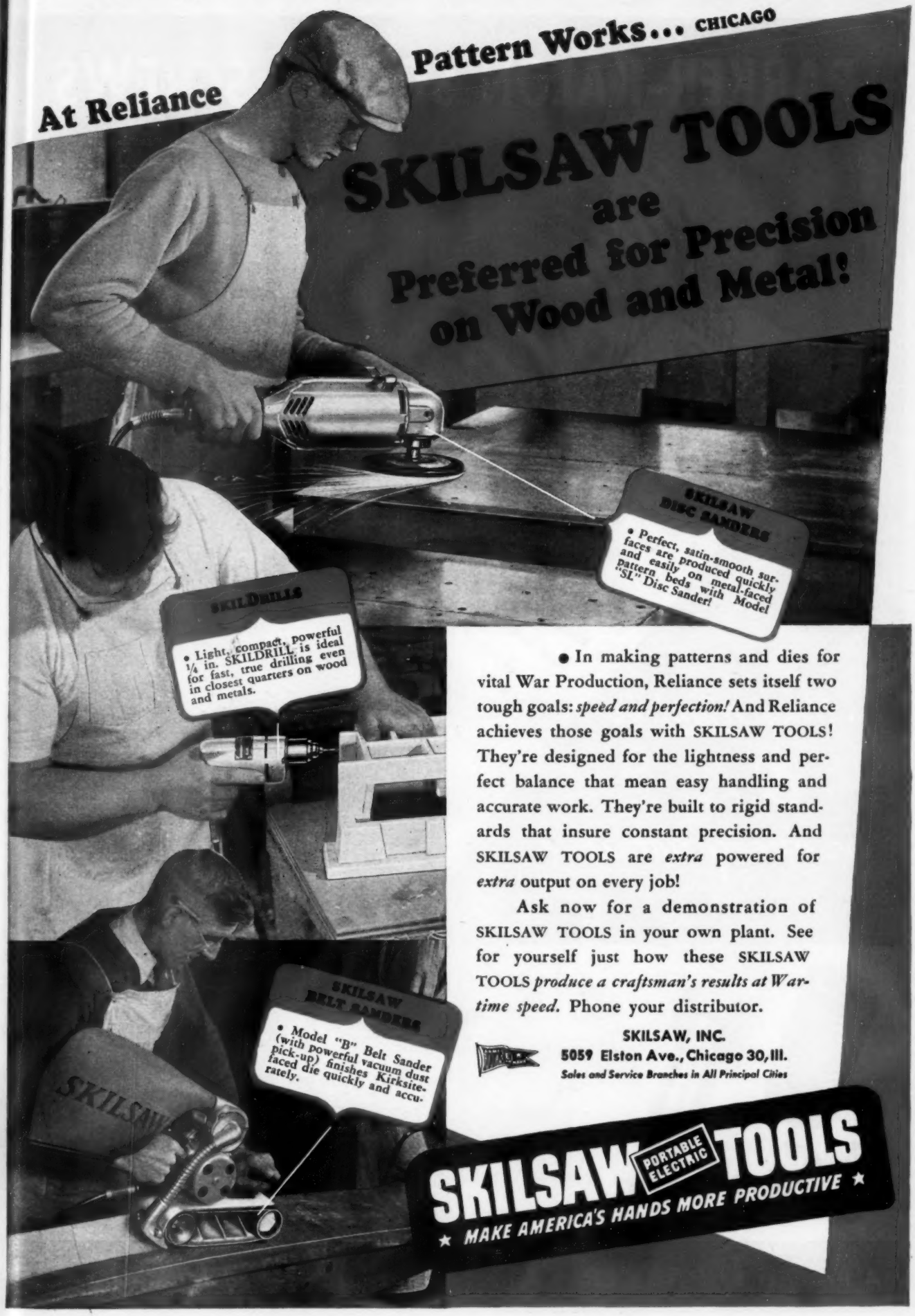
The manufacturer builds it into motors ... and it's there for keeps ... there to insure maximum capacity with safety at all times.

And the beauty of a built-in Klixon Protector is this ... it's a tireless watch-dog ... dependable at all times. It saves a motor's life over and over again. It clicks "off" every time a motor gets dangerously hot and then "on"... either automatically or by manual resist ... once the motor is cooled to safety.

Always insist on Klixon built-in Protectors with every motor you buy ... A.C. all sizes and D.C. up to 30 volts. You'll cut out burnouts. You'll reduce work stoppage, repair costs and delays. You'll lengthen your motors' lives.

KLIXON CIRCUIT BREAKERS

SPENCER THERMOSTAT CO., ATTLEBORO, MASSACHUSETTS

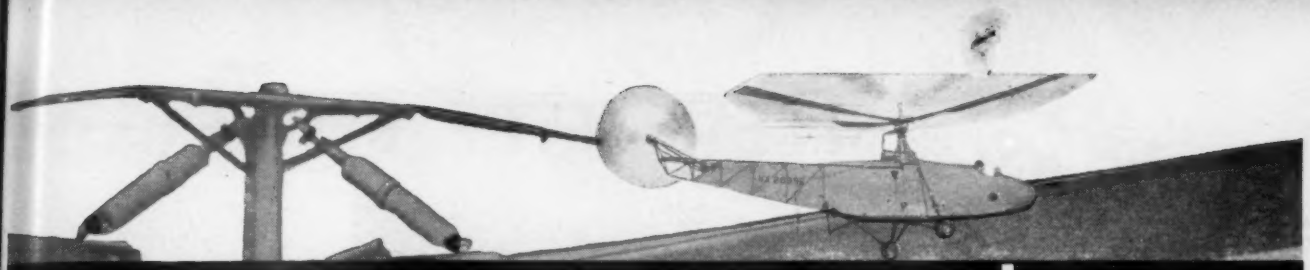

At Reliance Pattern Works... CHICAGO
SKILSAW TOOLS
are
Preferred for Precision
on Wood and Metal!
SKILSAW DISC SANDERS
• Perfect, satin-smooth surfaces are produced quickly and easily on metal-faced pattern beds with Model "SL" Disc Sander!
SKILDRILLS
• Light, compact, powerful 1/4 in. SKILDRILL is ideal for fast, true drilling even in closest quarters on wood and metals.
SKILSAW BELT SANDERS
• Model "B" Belt Sander (with powerful vacuum dust pick-up) finishes Kirksite-faced die quickly and accurately.
SKILSAW
• In making patterns and dies for vital War Production, Reliance sets itself two tough goals: *speed and perfection!* And Reliance achieves those goals with SKILSAW TOOLS! They're designed for the lightness and perfect balance that mean easy handling and accurate work. They're built to rigid standards that insure constant precision. And SKILSAW TOOLS are *extra* powered for *extra* output on every job!
Ask now for a demonstration of SKILSAW TOOLS in your own plant. See for yourself just how these SKILSAW TOOLS *produce a craftsman's results at Wartime speed.* Phone your distributor.
SKILSAW, INC.
5059 Elston Ave., Chicago 30, Ill.
Sales and Service Branches in All Principal Cities
SKILSAW PORTABLE ELECTRIC TOOLS
★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

PARKER-KALON SOCKET SCREWS

In the completely equipped Parker-Kalon Laboratories and Inspection Departments, a 16-point check up, unequalled in the industry, is made to control the quality of Parker-Kalon Socket Screws – to predetermine their performance in your assemblies – to make sure you get only those screws that can "take it."

Socket Screw users need this protection today more than ever. Specify "Parker-Kalon" next time you order . . . it costs no more. Parker-Kalon Corp., 194-196 Varick St., New York 14, N. Y.

A Product of PARKER-KALON -- *Specialists in Fastening Devices*



SAFEGUARDING THE HELICOPTER'S HEART

Elastic Stop Nuts are an old story on Sikorsky aircraft. They have been used on the Sikorsky clipper ships for years. They are found throughout the helicopter holding important structural fastenings.

One feature that has played an important part in the success of the Sikorsky helicopter is the development of "cyclic pitch control."

The mechanism that operates this control passes through the main rotor hub.

It is the heart of the helicopter.

And you will find this heart fastened safely and securely with Elastic Stop Nuts.

These are the nuts with the red elastic collar—the nuts which have revolutionized aircraft construction.

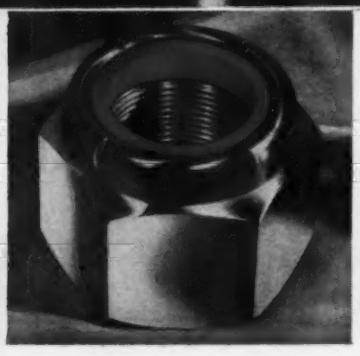
That red collar hugs the bolt and grips tight. It does not loosen under vibration or shock. It locks fast—anywhere on the bolt.

Nevertheless, you can take Elastic Stop Nuts off, and put them back on, time and time again, and they still retain their locking effectiveness.

Elastic Stop Nuts are going to prove godsends in countless postwar fastening problems. They will make products safer, better and longer lasting.

Any time you wish, our engineers will be glad to help with whatever fastening job you might have. They will recommend the correct Elastic Stop Nut to meet the situation.

LOCKED ON THE BOLT BY THE ACTION OF THE GRIPPING RED COLLAR.
THE COLLAR IS ELASTIC, THE NUT CAN BE USED TIME AND TIME AGAIN.
MADE IN ALL SIZES AND TYPES—WITH THREADS TO FIT ANY STANDARD TYPES OF BOLTS.



ESNA

TRADE MARK OF

ELASTIC STOP NUT CORPORATION OF AMERICA
UNION, NEW JERSEY AND LINCOLN, NEBRASKA

ELASTIC STOP NUTS

Lock fast to make things last

JOHNSON BRONZE

SLEEVE TYPE BEARINGS

Ready to use...

Johnson General Purpose Bearings save precious time in many ways. When you place your order you have over 800 sizes to choose from. This enables you to buy exactly according to your needs. Every General Purpose Bearing is completely machined inside—outside and ends. Thus they are ready for immediate installation. There is no extra machining . . . no cutting down . . . no excess stock to remove. Oil grooving slots or holes are easily, quickly and economically added when necessary.

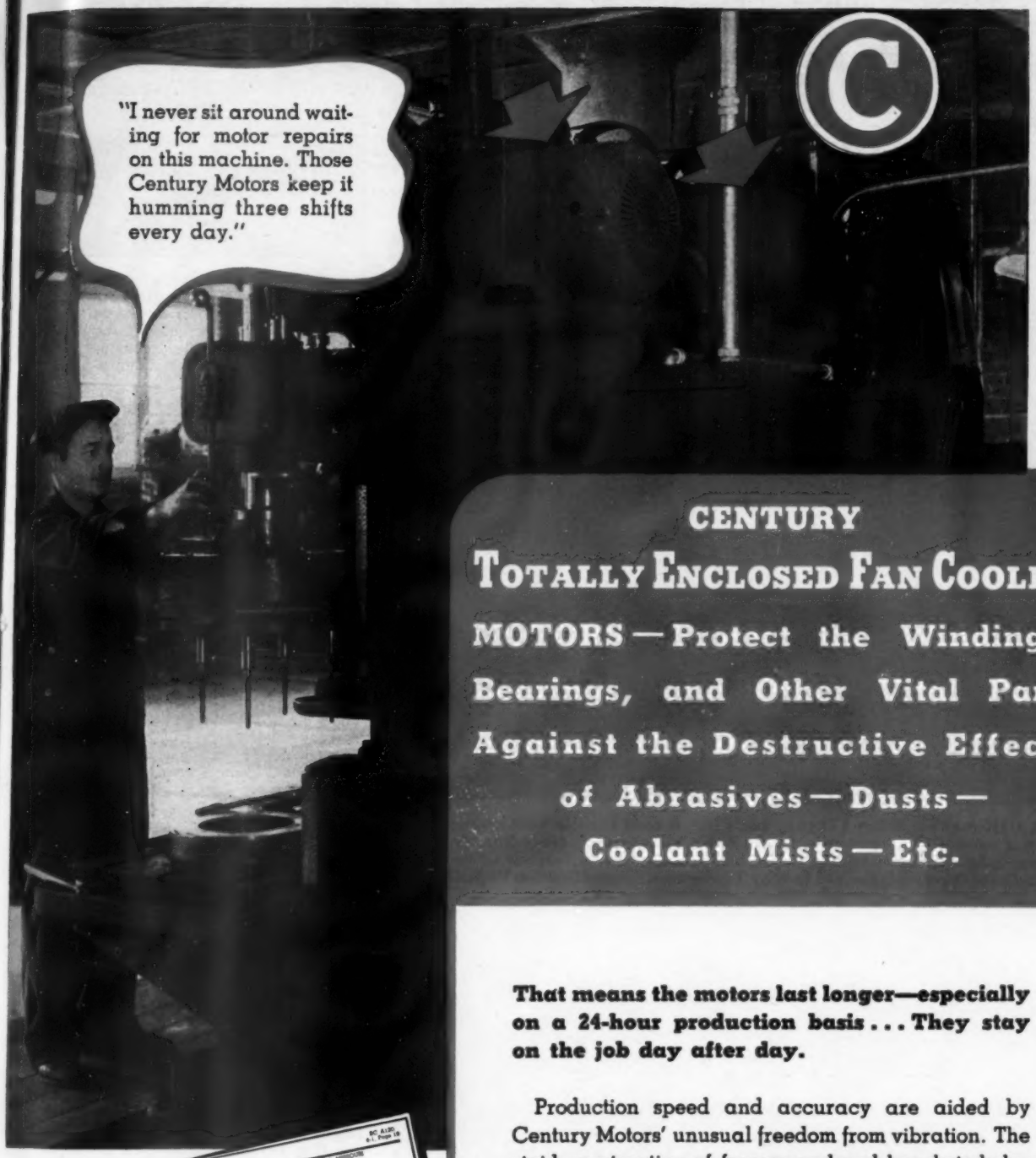
When properly installed, Johnson General Purpose Bearings will deliver a maximum of service with a minimum of attention. The next time you need plain, cast bronze bearings—call in your local Johnson Distributor. Permit him to show you how to save both time and money . . . how to avoid waste and delay by specifying Johnson General Purpose Bearings.

NEW
Catalogue

72 pages...lists and describes the most complete sleeve bearing service in the world. Write for your copy...TODAY.

JOHNSON BRONZE
SLEEVE BEARING HEADQUARTERS
515 S. MILL STREET NEW CASTLE, PA.

The MOST COMPLETE SLEEVE BEARING SERVICE in the WORLD


"I never sit around waiting for motor repairs on this machine. Those Century Motors keep it humming three shifts every day."

CENTURY
TOTALLY ENCLOSED FAN COOLED MOTORS — Protect the Windings, Bearings, and Other Vital Parts Against the Destructive Effects of Abrasives — Dusts — Coolant Mists — Etc.

That means the motors last longer—especially on a 24-hour production basis . . . They stay on the job day after day.

Production speed and accuracy are aided by Century Motors' unusual freedom from vibration. The rigid construction of frames and end brackets helps maintain these original uniform characteristics throughout the long motor life. In addition, Century totally enclosed fan cooled motors are liberally ventilated to keep the windings and bearings cool.

Ask for Century TEFC (Totally Enclosed Fan Cooled) Motors for atmospheres charged with abnormal quantities of destructive material, that give you extra hours of production, fewer shutdowns with less expense for care and upkeep—at only a little extra cost over Century general purpose, open rated motors.

Write for your copy describing Century TEFC Motors.

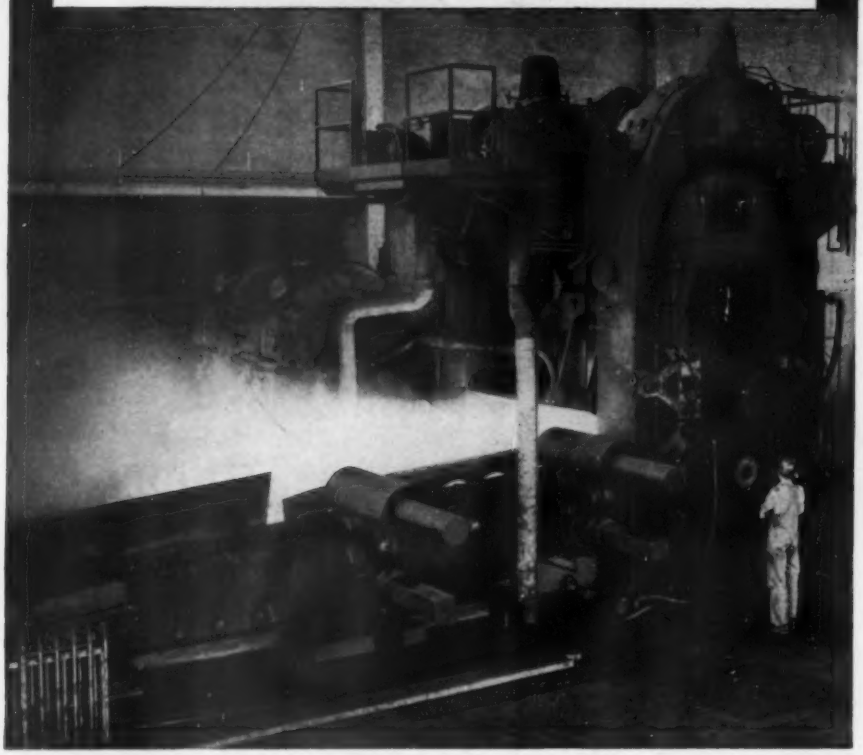
Century MOTORS

CENTURY ELECTRIC COMPANY 1806 Pine Street, St. Louis 3, Missouri

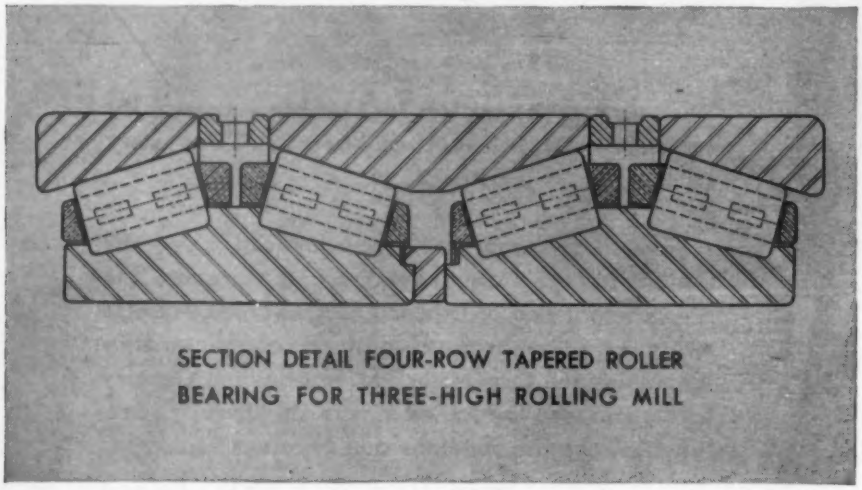
Offices and Stock Points in Principal Cities

357

IN THE NEWS
WITH TORRINGTON BEARINGS

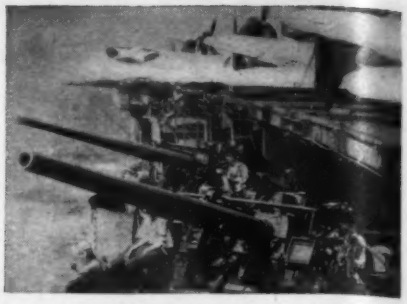


CALIFORNIA STEEL PLANT of Kaiser Company Inc.'s Iron & Steel Division went into operation last fall, rolling out steel sheets and plates for the West Coast industry's needs. This big, three-high rolling mill, built by Lewis-Foundry & Machine, is equipped with four-row tapered roller bearings illustrated below, designed and built by Torrington's Bantam Bearings Division.

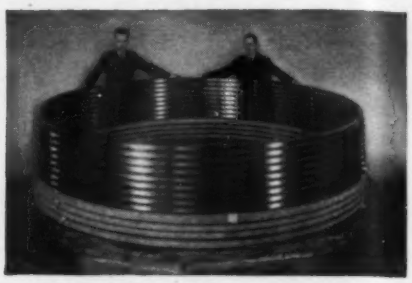


SECTION DETAIL FOUR-ROW TAPERED ROLLER BEARING FOR THREE-HIGH ROLLING MILL

X-SECTION of the 21.500" OD 4-row tapered roller bearing used on the working rolls of the three-high mill shown at top. There are 43 rollers per row. Radial capacity at 100 R.P.M. is 550,000 pounds; thrust capacity, 168,000 pounds. Design and manufacture of large and special bearings to precision and ultra-precision limits is a major part of the service of Torrington's Bantam Bearings Division.



1. THE CURTAIN OF FIRE thrown up by anti-aircraft batteries of our modern Naval units is the most effective ever developed. The extreme accuracy and precision of the gun control mechanisms are aided by the use of anti-friction bearings like those shown below.



2. TEN FEET IN DIAMETER, these are races for gun mount bearings for the 5" twin anti-aircraft guns. Held to tolerances of .002" in diameter, .001" parallelism, Bantam engineers devised special methods for machining and gauging the giant rings where the change of a few degrees in temperature would cause dimensional changes greater than the specified tolerance.

3. RETAINING CAGES STAMPED FROM STEEL were also designed by Bantam engineers to reduce weight, conserve critical material. Shown here is a typical "stamped" cage for 33-inch diameter thrust roller gun mount bearing. Retaining cage for the 10-foot diameter bearings are of similar design, but constructed in eight segments and welded together on assembly. For your special bearing needs, you will find Torrington's experience in the design and manufacture of anti-friction bearings of every major type helpful in the solution of your bearing problems. TURN TO TORRINGTON for your bearing needs.

ARMY E NAVY

TORRINGTON BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

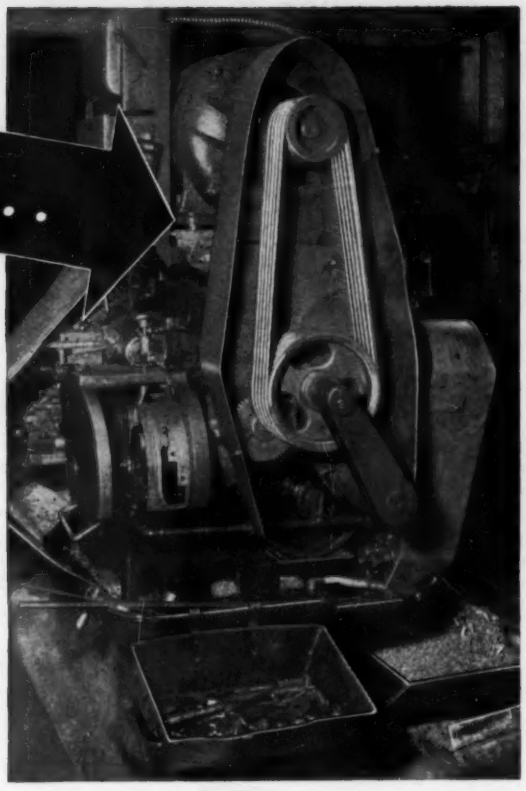
THE TORRINGTON COMPANY · BANTAM BEARINGS DIVISION

SOUTH BEND 21, INDIANA

On This Screw Machine . . . .

GATES V-Belts of *Special* Synthetic *Rubber*

wear more than 3-TIMES as long as belts of NATURAL Rubber!



Here is an excellent example of how well it pays to consult the Gates Field Engineer on *any* problem of drive operation.

On the screw machine pictured above, the Macomb Screw Products Company used natural rubber V-belts, getting 6 to 8 months' wear at 12 to 18 hours per day. Because a *severe oil condition* existed, the Gates Field Engineer recommended changing to Gates V-belts of special synthetic rubber. These special synthetic belts are averaging 18 to 24 months' wear at *24* hours per day—an increase of 300% to 400% in belt life!

You may not have in your plant any drive which offers this *particular* problem—yet *other* service conditions may be such that a V-belt of some special construction can most profitably be used. For example, in your particular installation, V-belts with tension members composed of flexible steel cables may prove to be the most efficient and economical. Again, Rayon Cord V-belts or Static-Safety V-belts may best fit your special need.

In any case, the wisest move you can make is to phone the Gates Field Engineer. He is thoroughly competent to analyze any drive problem. He is completely informed on the nature and advantages of every type of belt. He will always recommend the practice that will be most efficient and economical for you.

Your Gates Field Engineer Can Tell You Whether YOU Need—

1. *Special* Synthetic V-Belts
2. Steel Cable V-Belts
3. Cotton Cord V-Belts
4. Static-Safety V-Belts
5. Rayon Cord V-Belts

Your Telephone Directory Will Give You the Gates Field Engineer's Phone Number

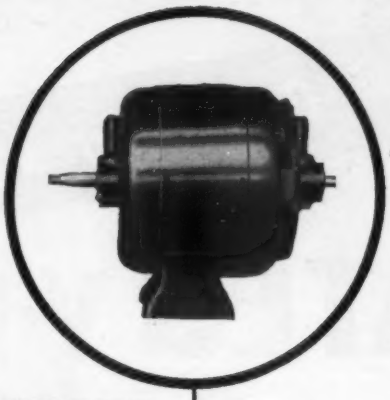
THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

442

GATES VULCO ROPE DRIVES

CHICAGO, ILL. 549 West Washington
NEW YORK CITY 215-219 Fourth Avenue
ATLANTA, GA. 738 C & S National Bank Building
LOS ANGELES, CAL. 2240 East Washington Boulevard
DENVER, COLO. 999 South Broadway
DALLAS, TEXAS 2213 Griffin Street
PORTLAND, ORE. 333 N. W. 5th Avenue
SAN FRANCISCO, CAL. 1090 Bryant Street



*SPECIAL MOTORS DESIGNED TO FIT THE APPLICATION

A MILLION STARTS AND STOPS

To prevent intricate mechanisms from skipping figures, electric motors for calculators, electric typewriters, cash registers and tabulating machines must provide constant speed and must make millions of starts and stops . . . without requiring repairs or replacements during the life of the equipment.

Many different types of office machines are powered with Holtzer-Cabot motors designed especially to meet these conditions. Manufacturers of many other kinds of products from instruments to meat grinders have found that special fractional HP motors built by Holtzer-Cabot, improve operation and increase the saleability of their products, and reduce maintenance problems.

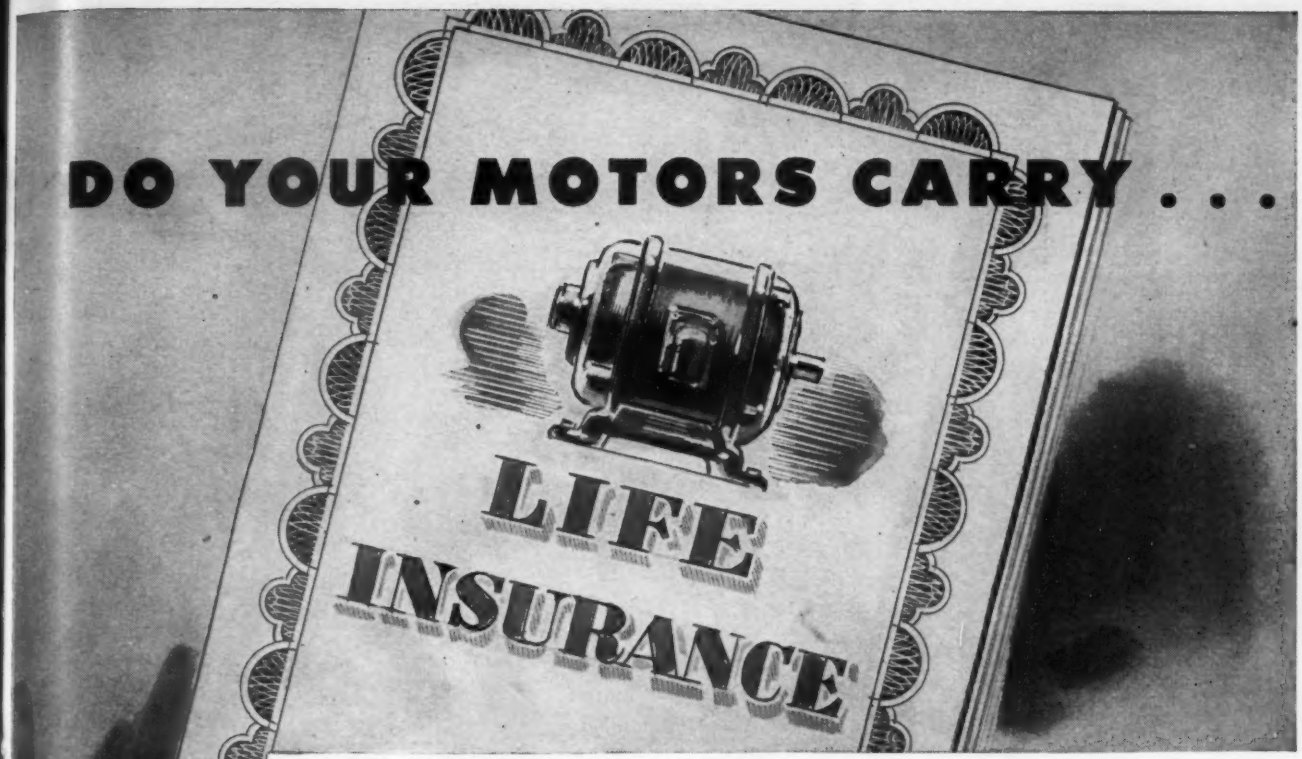
If you are designing or building post-war products which will require fractional HP motors, our engineers, backed by 68 years of experience in special motor design, would like to talk with you about your motor problems. There is no obligation.

THE HOLTZER-CABOT ELECTRIC COMPANY

Designers and Builders of Special Fractional HP Motors and Electrical Apparatus

125 AMORY STREET, BOSTON 19, MASS. CHICAGO, ILL., NEW YORK, N.Y., PHILADELPHIA, PA.

DO YOUR MOTORS CARRY . . .



The life of a motor is no longer than the life of its bearings. Bearing failure means motor failure and shutdowns. And the bearings may fail for any or all of the following reasons:—(a) poor design and construction; (b) neglected lubrication; (c) use of lubricant of poor quality; (d) dust and dirt in the bearings.

MOTOR MANUFACTURERS WHO HAVE ADOPTED NORMA-HOFFMANN "CARTRIDGE" BALL BEARINGS ARE PROVIDING THEIR CUSTOMERS IN-BUILT MOTOR LIFE INSURANCE--IN EFFECT, A GUARANTEE OF LONGER, MORE TROUBLE-FREE, LOWER-COST MOTOR PERFORMANCE—because:—

A. The "CARTRIDGE" BEARING is a NORMA-HOFFMANN PRECISION product, designed EXPRESSLY to meet electric motor requirements.

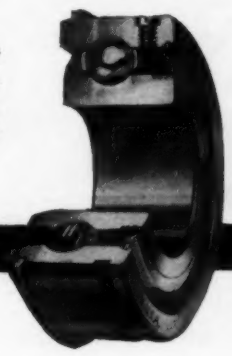
B. With its double-row width, the "CARTRIDGE" BEARING provides WITHIN ITSELF a supply of lubricant at least twice that of any other single-row ball bearing.

C. The "CARTRIDGE" BALL BEARING is loaded at the factory with NORMA "STABILITY-TESTED" GREASE—a high-duty lubricant which has exceptional life and a wide temperature range, and moreover is chemically stable and water-repellent.

D. The highly efficient, wearless metal seals of the "CARTRIDGE" BEARING, so effective in KEEPING LUBRICANT IN the bearing, are equally effective in KEEPING DUST AND DIRT OUT. And they are removable and replaceable, making bearing inspection easy.

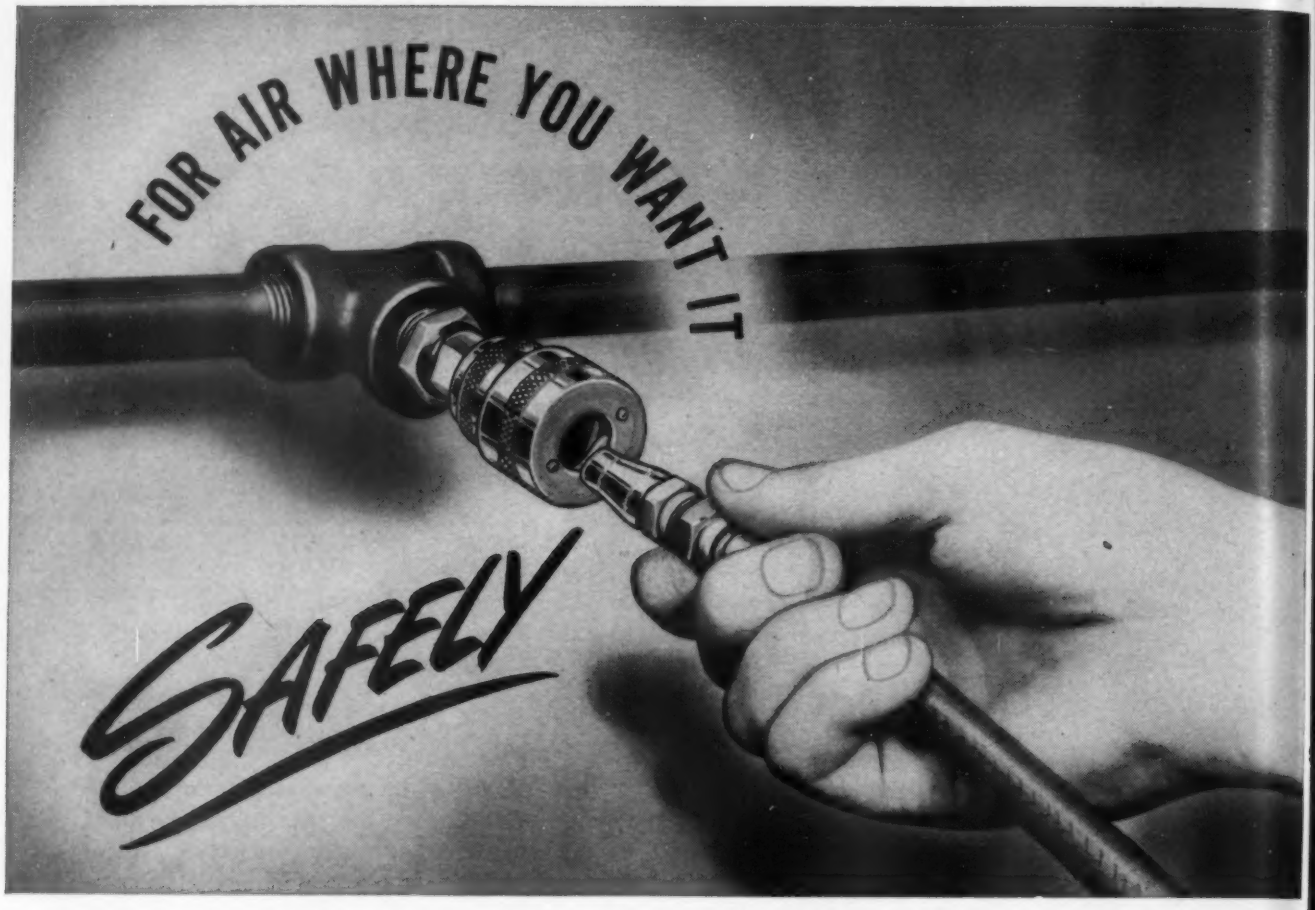
These, and other, distinctive features explain why so many motor manufacturers, seeking to assure their customers MAXIMUM MOTOR LIFE, have adopted NORMA-HOFFMANN "CARTRIDGE" BALL BEARINGS for their latest and most efficient motor models.

Ask for motors carrying the "life insurance" that NORMA-HOFFMANN "CARTRIDGE" BEARINGS provide. They will be a sound and lasting investment, returning good dividends in lower costs, longer life, and freedom from shutdowns.



NORMA-HOFFMANN BEARINGS CORP'N, STAMFORD, CONN. FOUNDED 1911

TO WIN THE WAR • WORK • FIGHT • BUY WAR BONDS



INSIST ON

SCHRADER AIR COUPLERS

QUICK-ACTING

SAVES AIR
SAVES TIME
SAVES MONEY

Schrader
CONTROLS THE AIR

ARMY E NAVY

These days you have to save steps so you certainly want the convenience of plugging in on an air line right next to the job. But when you plug in you want to be sure you stay plugged in until *you* are ready to disconnect. You don't want accidental tugging or tripping to pull out the line, waste air, interrupt work. In using sections of coupled hose, you don't want chance snagging of the coupler—on floor or work to disconnect and whip hose about dangerously.

You need have no worries with the Schrader Swivel Type Air Coupler. It plugs in with one easy push and *locks* automatically. Release requires only a slight twist of the coupler sleeve but it must be a *twist.* Pulling or tugging on the coupler or line can't loosen *this* coupler. See that you get Schrader—the safer, stronger (steel) Air Coupler for all outlets and all air tools.

Order through your distributor or write for details and prices. Send for Catalog No. 10 describing Schrader Quick-Acting Air Couplers and many other Schrader Industrial Products for the effective control and use of *air power.*

SCHRADER PRODUCTS FOR INCREASED PRODUCTION—GREATER SAFETY

Air Valves, 2, 3, 4-way • Machine Operating Air Controls • Quick-acting Couplers
Blow Guns • Safe Operating Controls • Air Ejection Sets • Hydraulic Gauges

A. SCHRADER'S SON, *Division of Scovill Manufacturing Company, Incorporated,* **BROOKLYN, NEW YORK**

THE STORY OF STEEL

FROM FURNACE TO FIRING LINE IS TOLD BY "FACTS-IN-FIGURES"

In a steel mill, Control by Count begins with the ore-cars which are tallied by a Veeder-Root Magnetic Counter, as they unload on top of the furnaces. Ingots are counted as they enter the blooming mill and again counters are used as the steel enters the rolls where space between rolls must be accurately maintained. This space is visualized for the operator by motorized counters that read in thousandths of an inch, and help him to control steel-thickness. Here, too, the white-hot ingots are counted by *their* own light which actuates a sensitive electric tube.

Veeder-Root Counting Devices are also used to measure the number of feet of production of structural shapes . . . the length of any defects in finished bars . . . the number of "wraps" of steel on reels in reversing mills . . . the length in feet of total sheet produced.

Veeder-Root Counters are used for many different jobs in tube, pipe, and wire mills . . . in handling and transporting . . . to control input of electric current into mill motors, the amount of coal automatically stoked, or the amount of gas consumed. Finally, they do many jobs in the front office, on phones, typewriters, business machines . . . even helping in payroll and personnel work. Then when steel is made into tools of war, the Armed Forces take over, and Control by Count continues right up to the battle lines.

Every inch of the way, steel counts heavily on these "fighting figures" supplied by Veeder-Root Devices. And if your work is of frontline importance, then *you* can count on Veeder-Root, too.

ARMY E NAVY

77204

VEEDER-ROOT

INCORPORATED

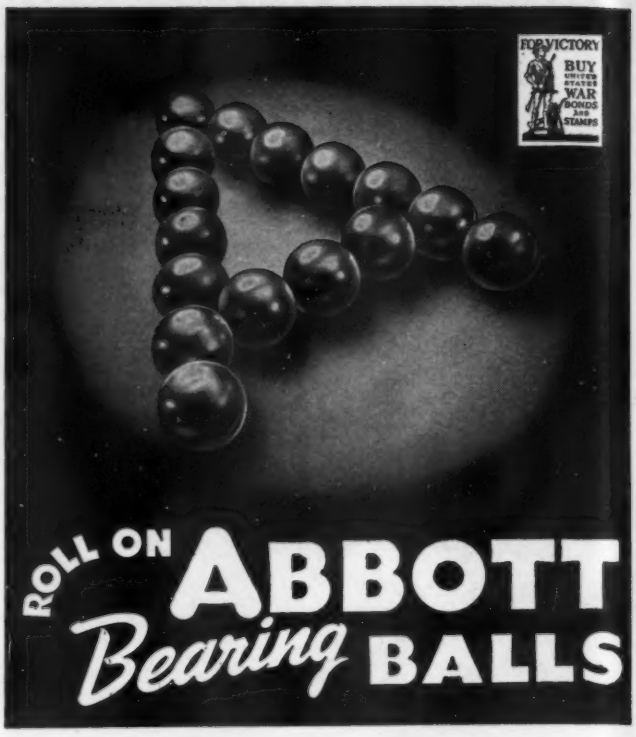
Hartford, Connecticut, U. S. A.

SECOMET
DIAMOND WHEELS

When the war is won—Americans will enjoy higher standards of living than ever before. Motor cars, airplanes, trucks and tractors, home appliances, every machine and tool that's made of metal, will be better, safer and stronger. JKS Diamond Wheels will help to make this possible by processing tougher metals, with greater precision. Far-sighted companies are already designing new products, scanning new outlets and perfecting plans for cutting their costs with improved machine tools. To such executives this is an invitation to write today to—

J. K. SMIT & SONS

157 Chambers St., New York, N. Y. 6400 Tireman Ave., Detroit, Mich.



ROLL ON ABBOTT *Bearing* BALLS

UNINTERRUPTED PERFORMANCE

SPECIFY "ABBOTT" — When you use ABBOTT BEARING BALLS you are assured of uninterrupted performance whether the application is a light, intricate mechanism or a heavy duty assembly. ABBOTT will carry the load as planned.

• *Estimates of Delivery gladly given* •

THE ABBOTT BALL COMPANY HARTFORD, CONN. U.S.A

CAN BE
THROTTLED
without building up pressure

Model 9840

GUSHER
COOLANT PUMPS

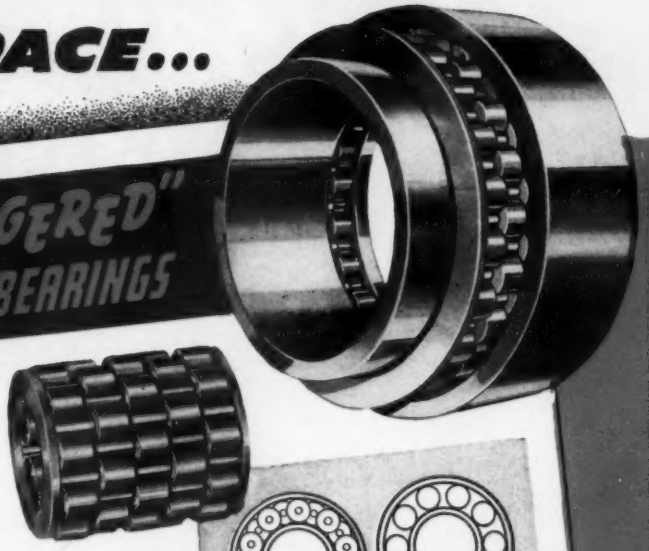
. . . and less power is consumed when Gusher Coolant Pumps are either partially or totally throttled. Easy adaptability for quick change-overs. No packing glands to leak, consume power or require adjustment. Learn about other advantages of Gusher Coolant Pumps. There's a model and type for your needs. *Write for new complete catalogue.*

Available in any current characteristics, including 25 cycle, 1, 2, or 3 phase. Totally enclosed ¼ h.p. motor.

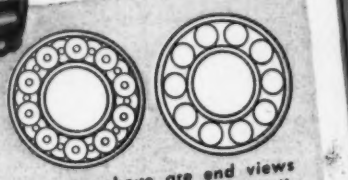
THE RUTHMAN MACHINERY CO.
1809 READING ROAD CINCINNATI 2, OHIO
LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

Greater LOAD CARRYING CAPACITY IN SMALL SPACE...

ORANGE "STAGGERED" ROLLER BEARINGS



The exclusive design of Orange Staggered Roller Bearings is the solution where extreme ruggedness, as well as smooth, even running are required in heavy duty applications. The staggered roller arrangement distributes the load over many short rolls instead of over a few full length rolls, as in conventional types. This multiplicity of contact points within the loaded zone insures an even-running bearing of greater load carrying capacity, enabling Orange Staggered Roller Bearings to do the same work as larger conventional types. Write for engineering data book giving details of design, sizes, capacities and typical applications.



Shown above are end views of an Orange Staggered Roller Bearing and a conventional roller bearing. Note how staggered design brings maximum roller surfaces in contact with the load.

ORANGE ROLLER BUSHINGS

Orange Roller Bushings are providing two important advantages for many well-known machinery manufacturers, namely: Greater load carrying capacity in limited space and exceptional service records of trouble-free operation.

In Orange Roller Bushings, roller clearances are minimized by a rigid standardization of size, which provides much closer running clearances . . . prevents rollers from running tangent to race . . . and results in extremely quiet, long-life operation.

Write for engineering data book showing design, types, dimensions and capacities of Orange Roller Bushings.

ORANGE
ROLLER BEARING CO., INC.
ORANGE • NEW JERSEY

LARGE GEARS *or* SMALL—*to closest tolerances*—PROMPTLY

Any type gear — from 2" to 52" in diameter can be produced to exacting precision requirements by SIER-BATH.

The same high standards of accuracy apply to all SIER-BATH gears. Through every operation of machining and heat treating, SIER-BATH employs modern methods and modern machine tools, together with a system of checking and inspection which assures accuracy at every step.

The large bull gear blank shown here has already been checked for accuracy before teeth are cut. When completed it must pass the most rigid inspection.

If you require precision gears, SIER-BATH can produce them. Let us have your specifications for estimating purposes. No obligation, of course.

SIER-BATH GEAR CO.
9254 HUDSON BOULEVARD — NORTH BERGEN, N. J.
Incorporated

The Doorway to 38 years experience in making Precision Gears

THIS GOES IN ONE OF THOSE PLANETORQUE-MOTOREDUCERS

THOSE P-Ms SAVE A PILE OF TROUBLE BY STOPPING OVERLOAD DAMAGE

The PlaneTorque MotoReduceR is a self-contained drive (in either vertical or horizontal types) plus the safety feature that instantly and automatically shuts off power by a mechanical means, whenever a predetermined load limit is reached.

This feature protects both the MotoReduceR and the equipment it is driving from damage

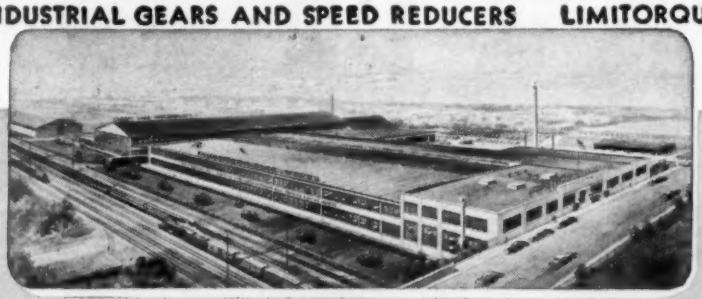
by overloads or jamming. For stokers, elevators, conveyors, mixers and similar applications it is ideally suited.

These drives are available in horsepowers and ratios to fit almost every need . . . want more details?

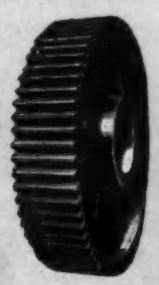
PHILADELPHIA GEAR WORKS, INC.

INDUSTRIAL GEARS AND SPEED REDUCERS **LIMITORQUE VALVE CONTROLS**

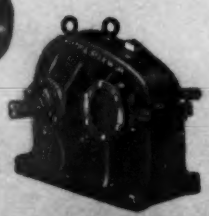
ERIE AVENUE & G STREET
PHILADELPHIA 34, PENNA.
NEW YORK, PITTSBURGH, CHICAGO



Philadelphia **LIMITORQUE CONTROL** operates all types of valves, etc., safely, economically, from convenient stations.



Philadelphia **GEARS** All types and sizes of industrial gears. Can be supplied in all materials.



Philadelphia **HERRINGBONE SPEED REDUCER** for heavy loads at high speed. Single, Double, Triple Reductions, various ratios and horsepowers.

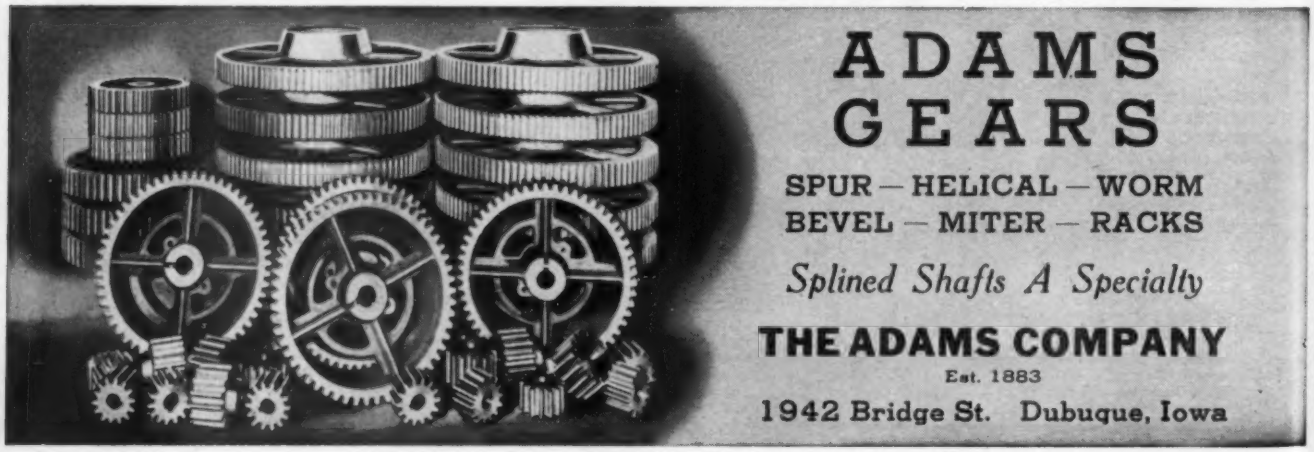
Philadelphia **MOTOREDUCER** The economical self-contained drive, Horizontal or Vertical types — various ratios and horsepowers.

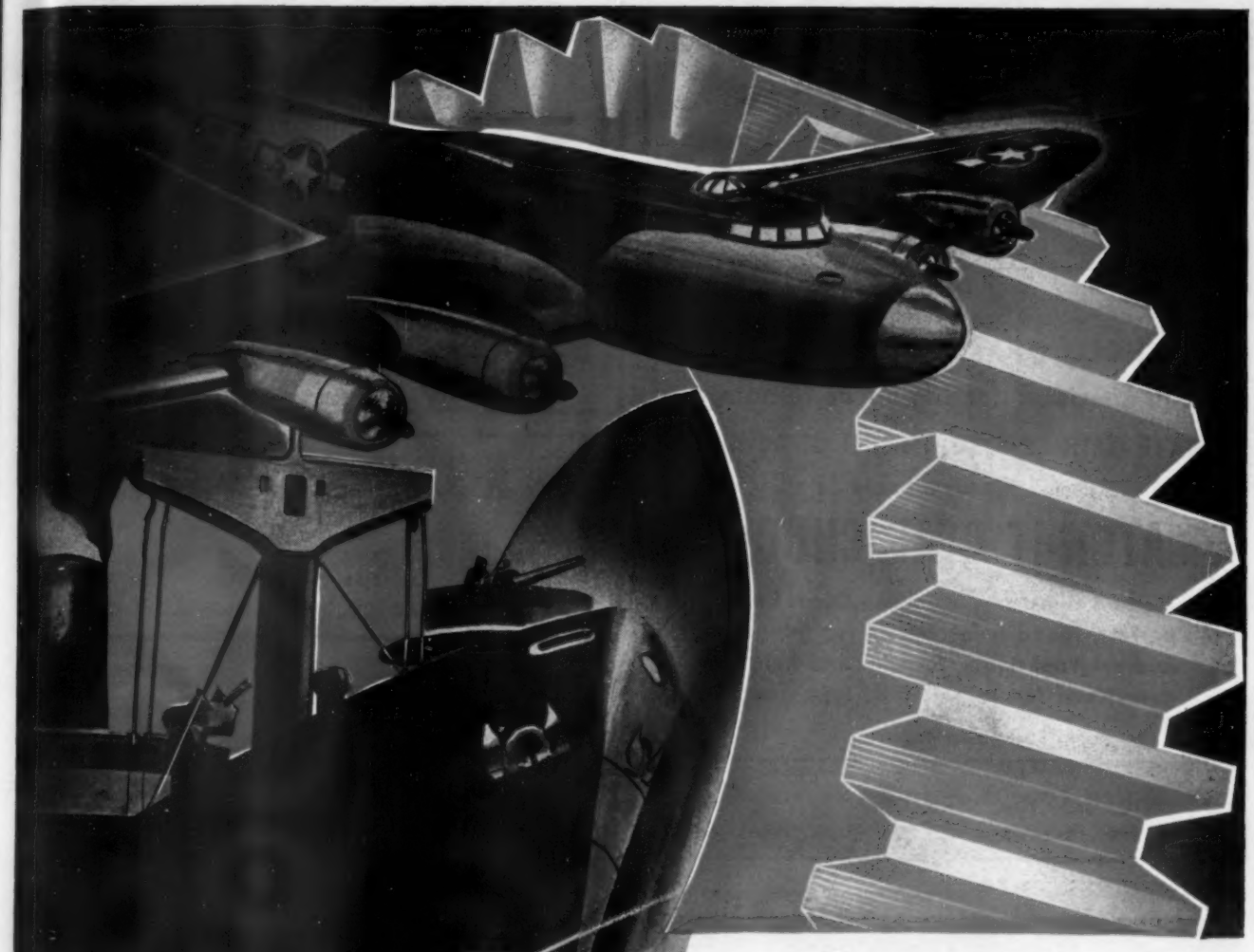
Philadelphia **WORM GEAR SPEED REDUCER** right angle drives — vertical or horizontal. Wide range of ratios and horsepowers.

"HARTFORD"
GEARS • CAMS
THREAD GRINDING
. . . TO YOUR SPECIFICATIONS
When you come to "HARTFORD" you get what you order—without delay—at reasonable cost.
Send specifications—ask for quotations.
THE HARTFORD SPECIAL MACHINERY COMPANY
HARTFORD, CONN.

"When your specifications call for special gears — Spur — Bevel — Mitres — Helical — Worms and Worm Gears —Reduction Units—Why not try GRANT.
You will find GRANT service meeting all requirements of both stock and special gears."
GRANT GEAR WORKS
BOSTON

Gear Specialties
SPURS • HELICALS • BEVELS
(Straight & Spiral)
WORM GEARING • THREAD GRINDING
(14 to 96 D. P.)
This range logically embraces the gear components of many critical control devices essential to the war effort and this organization is proud of its contributions of such material in the program.
With full production capacity scheduled far into the future, all new inquiries are now necessarily subordinated to these vitally important prior commitments. However, every urgent need will be given careful consideration.
Gear Specialties
MANUFACTURERS
CHICAGO
2600 W. Medill Av.
Ph. Hum. 3482


ADAMS
GEARS
SPUR — HELICAL — WORM
BEVEL — MITER — RACKS
Splined Shafts A Specialty
THE ADAMS COMPANY
Est. 1883
1942 Bridge St. Dubuque, Iowa



On Land— At Sea— In the Air!

The soundest guide as to how Perkins Precision Custom-Cut Gears can help your production problems of the future, is found in the record of their present accomplishments.

Perkins Gears are integral parts of fighting equipment on land, at sea and in the air. Hence, they must meet rigid government specifications—which sums up anything that could be said about this organization's ability to produce precision gears for predetermined purposes.

Manufacturers in need of advice on the subject of gear engineering and problems of gear supply are invited to consult with our technical staff NOW.

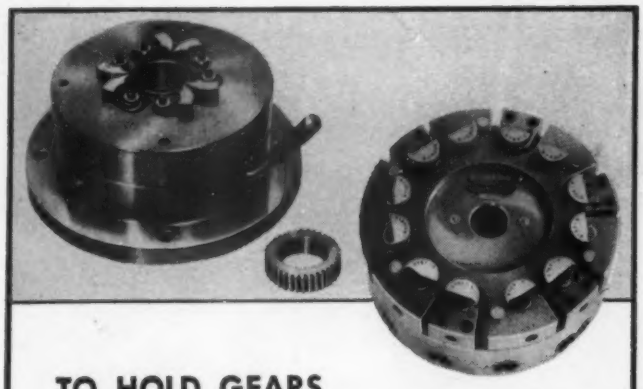
PERKINS PRECISION, CUSTOM-CUT GEARS

PERKINS MAKES:

Helical Gears	*Bevel Gears*	*Ratchets*
Work Gears	*Spiral Gears*	*Spur Gears*

Ground Thread Worms

Perkins Machine & Gear Company, Springfield 2, Mass.



TO HOLD GEARS
with precision for boring or grinding
HAVE TEETH GRIPPED ON LINE OF ACTION
Principle used only in

MATCH-IT GEAR CHUCKS

Method eliminates distortion. Gears have perfect, round holes. Made for internal and external gears, for spur and helical gears, and for countershaft type gears.

Send for catalog

LeMaire Tool & Manufacturing Co.
2665 So. Telegraph Rd., Dearborn, Mich.

Good Results . . . USUALLY DEPEND UPON *Good Judgment* . . .

FOR CONSTANT, TROUBLE-FREE SERVICE
Specify CINCINNATI GEARS

★ SPUR
★ BEVEL
★ HELICAL
★ SPLINE
★ WORM
★ SPECIAL

When you need dependable and precise accuracy in your gears . . . call on us. Our organization is completely equipped and fully qualified to meet your every requirement for fine gears.

From our very beginning 40 years ago Cincinnati Gears have always been made to meet the specialized needs and specific requirements of each individual gear problem.

For Good Results we suggest you specify Cincinnati . . . "Gears, Good Gears Only".

★

THE CINCINNATI GEAR COMPANY
"Gears . . . Good Gears Only"
Wooster Pike and Mariemont Ave. ★ Cincinnati 27, Ohio

EACH GEAR A MASTER GEAR

and the way MEISEL builds gears, there's just one *right* gear for any specific job. Designed for use under conditions that exist, MEISEL Gears actually "belong" to a machine . . . are inherently able to give longer, quieter, more economical service. Investigate the advantages of *specifically* engineered gears by MEISEL.

MEISEL PRESS MFG. CO.
946 Dorchester Ave. Boston, Mass.

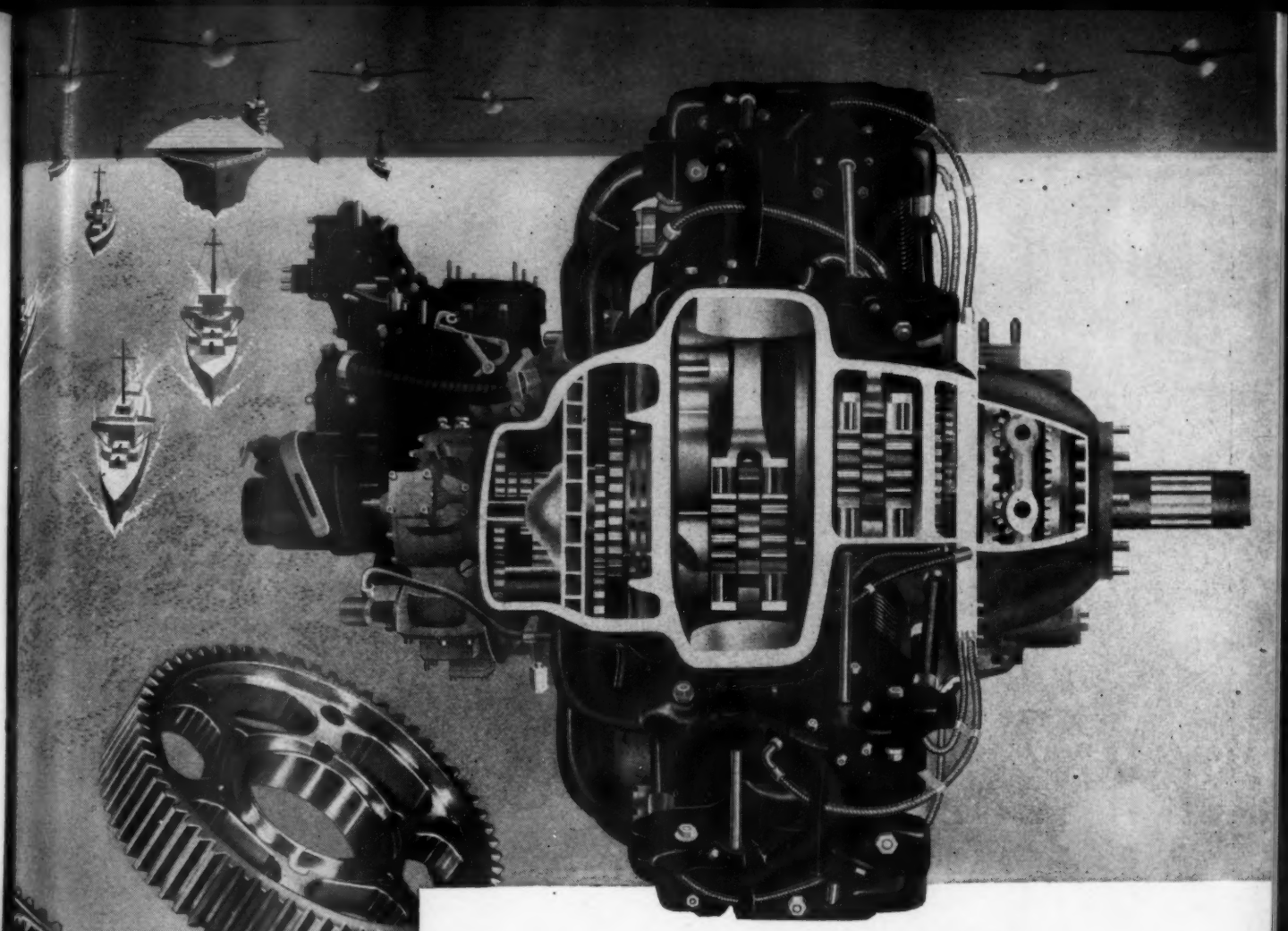
GANSCHOW GEARS
FOR SIXTY YEARS
Spur—SPEED REDUCERS—Worm
ALL TYPES OF CUT GEARS
GANSCHOW GEAR CO., 18 N. Morgan St., Chicago

BRAWNY GEARS
PROMPT
ECONOMICAL SERVICE
ALL TYPES, MATERIALS
AND QUANTITIES
Ask for Estimate
BRAUN GEAR CO., 1590-1608 Atlantic Ave., Brooklyn, N. Y.

SEND US YOUR PRINTS FOR *Quotations*
GEAR SPECIALISTS — BROACHING
THREAD GRINDING
TAYLOR MACHINE Co.
1917 EAST 61ST ST. ★ CLEVELAND 3, Ohio

Let's
BACK THE ATTACK
By Buying WAR BONDS

GEAR CUTTING MACHINES
New Design
New Features
New Advantages
NEWARK GEAR CUTTING MACHINE CO.
69 Prospect Street, NEWARK 5, NEW JERSEY
FRANK E. EBERHARDT, *President*



Tomorrow's Gears Proved in Today's Laboratory . . .

EVER look inside a Twin Wasp engine? Here the power of 1200 horses is packed in a space no wider than your outstretched arms.

And notice the gears in this mighty engine—gears so compact and necessarily so light in weight that only extreme precision makes it possible for them to carry their tremendous load.

In the three precision gear plants of Foote Bros. new manufacturing methods, new technical developments plus the skill and "know how" of Foote Bros., engineers are today producing these high precision gears in amazing quantities. Outstanding developments in heat-treating and carburizing—an exact metallurgical control—the latest improvements in gear checking instruments—all these plus the skill and knowledge of a force of experienced men and women numbering more than 6,000 assure volume production of these metallurgically and dimensionally perfect gears.

Tomorrow when victory is ours, the precision gear production achieved in the plants of Foote Bros. promises American manufacturers a new economy in the transmission of power. For in compact speed reducers and aircraft devices—in marine motors and gear trains as well as in Pratt and Whitney engines, these precision gears are today showing the way to new standards in engineering which may be devoted to peacetime production when the war is won.

FOOTE BROS. GEAR AND MACHINE CORPORATION
5225 South Western Boulevard • Chicago 9, Illinois

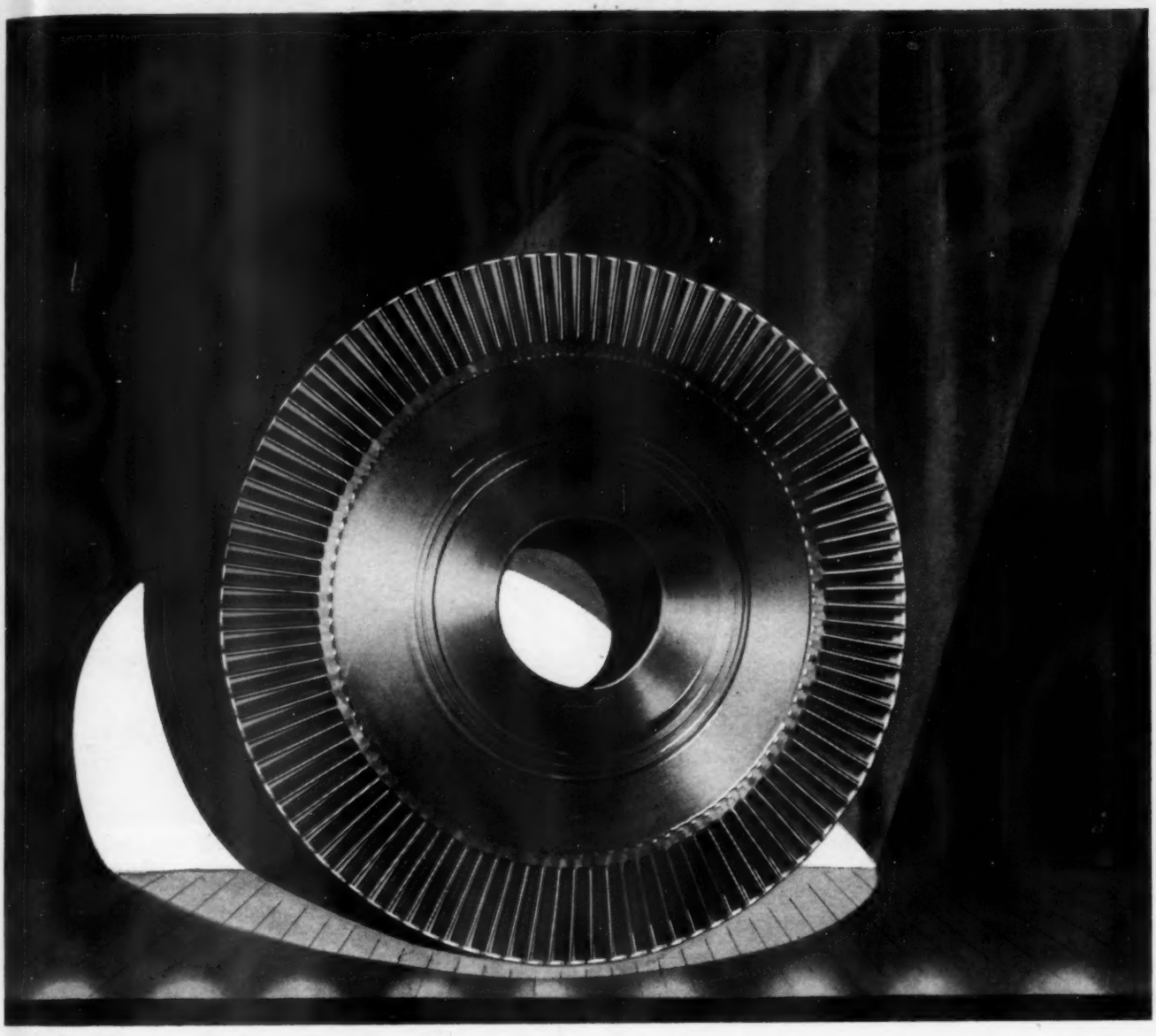
FOOTE BROS.

Better Power Transmission Through Better Gears

More production per man hour is being obtained in war plants using Niagara Power Squaring Shears. Convenient operation, quick, accurate setting of ball bearing, self-measuring parallel back gage, full visibility of cutting line, instant-acting Niagara sleeve clutch and complete accessibility at rear are some of their modern features. Built in a complete range of capacities and sizes. Niagara Machine & Tool Works, Buffalo 11, N. Y. District Offices: Detroit, Cleveland, New York.

Shear knives available for cutting alloy and special steels. Let us know what you desire to cut. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory re-grinding service by the same skilled men who grind new Niagara knives.

BUY UNITED STATES WAR BONDS AND STAMPS



"In the Spotlight"...

for Post-War Mass Production of Turbine Broaching

BROACHES, all types and sizes . . . . . GAGES, Serration, or Spline, male or female . . . . . Master Gears and Gear Racks . . . . . Master Index Plates . . . . . Splined Arbors for gear-grinding . . . . . Hobbing, Shaving and Checking . . . . . Gear Designing and Engineering . . . . . Form Cutting Tools . . . . . Production Broaching and Machining.

GL B&G CO.

GREAT LAKES

Broach & Gage Company

1008 FRANKLIN STREET . . . DETROIT 7, MICHIGAN

SINCE 1916 KRW A MARK OF DEPENDABILITY

SPEED

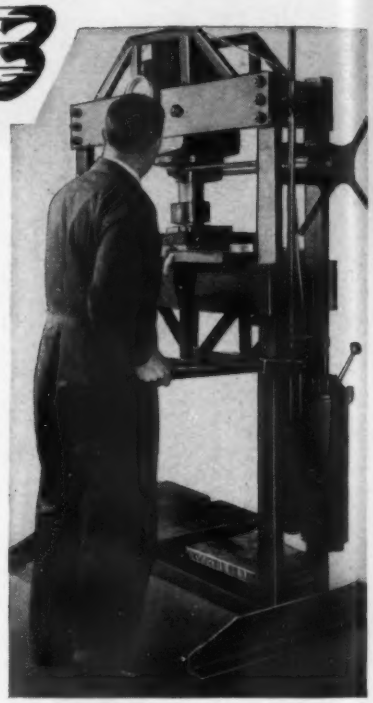
1

SPIN THE HANDWHEEL and the ram speeds to the work by fast mechanical action instead of slow, laborious hydraulic pumping.

2

FLIP THE BALL ARM to close the valve instead of slowly turning a handwheel type control.

3



START PUMPING and immediately get tons of pressure on the work because the hydraulic cylinder was automatically filled with oil during oper. No. 1.

3 QUICK MOTIONS OPERATE KRW HYDRAULIC PRESSES!

SPEED is the basic design feature of KRW Hydraulic Arbor Presses—*they are faster than most power-operated presses.* In operation, you get *speed* in bringing the ram to the work ... *speed* in developing hydraulic pressure... *speed* in raising the ram to remove the work. These KRW features have sold thousands of our hydraulic presses to industry where they are doing work formerly considered only possible on larger, heavier and more costly equipment. Ingenious adaptations of KRW presses have been built to handle many kinds, sizes and types of material. All, of course, incorporate the KRW principle of SPEED in operation. Write for our new bulletin describing KRW Hydraulic Presses in 25, 50, 60 and 75-ton capacities.

IMMEDIATE DELIVERY
on AA-4 Priority or better

K. R. WILSON
10 LOCK ST., BUFFALO 2, N. Y.

THIS STANDARD PRESS DOES SPECIAL JOBS

Before You Buy Expensive

SPECIALIZED MACHINERY

Investigate

FEDERAL'S VERSATILITY

● Standard Federal Presses are not only of the most advanced design—ruggedly built to stand up under the hardest usage and give many years of continuous service—but also exceptionally versatile; capable of producing scores of special items which formerly would have required expensive specialized machinery of limited utility. Primary, secondary, and assembly operations are accomplished quickly, safely, and precisely. Burnishing, broaching, forming, staking, and high speed marking are handled with ease. As a result, production speed is often increased as much as 3 to 6 times—and production costs cut to remarkably low figures. Take advantage of Federal's versatility—for today's high-speed war production and tomorrow's low-cost peace-time demands. Orders are also being accepted now for prompt post-war delivery.

THE FEDERAL PRESS CO.

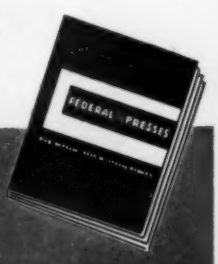
102 Division Street, Elkhart, Indiana

FEATURES

Front Operated Recline • Timken Roller Bearing Flywheels • Frame-Anchored Knockout Bracket • Symmetrical Rams Longer "V" Ways and Gibs • Oversize Crankshafts • Non-Repeat Clutch Mechanism • Safety Latch Spring

WRITE FOR NEW CATALOG

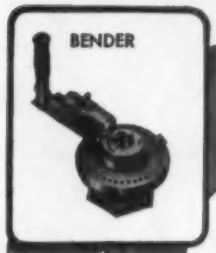
Valuable new catalog illustrates and describes complete line of Federal Dial Feeds and Open-Back Inclinable Presses. Write for yours today.



FEDERAL

OPEN-BACK—INCLINABLE

PRESSES



"DIE-LESS" DUPLICATING

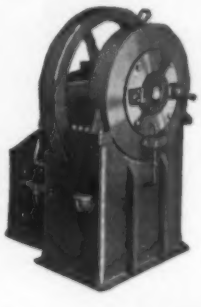
NO DIES!

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

"DIE-LESS" DUPLICATING might be described as a new industrial technique made possible by the accuracy, extreme adaptability and ease of operation of DI-ACRO Precision Machines — Shears, Brakes, Benders — especially when used as a continuous, integrated production process.

The DI-ACRO System of METAL DUPLICATING WITHOUT DIES has proven its adaptability in making parts just as accurately as can be done with dies, to a tolerance of .001" in all duplicated work. The delay of waiting for dies is avoided, deliveries speeded up. *Write for Catalog.*

O'NEIL-IRWIN MFG. CO. 311 EIGHTH AVE. SO., MINNEAPOLIS 15, MINN.

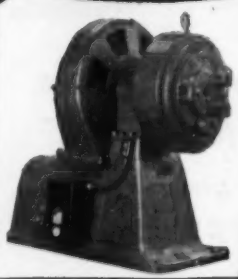


THE
TORRINGTON
ROTARY
SWAGING MACHINE

— with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Torrington Swaging Machine."

The Torrington Co., Swager Dept.
56 Field Street Torrington, Conn.

"Ask ETNA about Swaging"



● If you have a production phase that calls for tapering, sizing or reducing of solids or tubes, you can save money if you "ASK ETNA ABOUT SWAGING." The superior performance of ETNA machines assures you more pieces per hour at lower cost. Built in capacities of ⅛" to 4" . . . larger sizes built to order!

Ask for our swaging catalogs

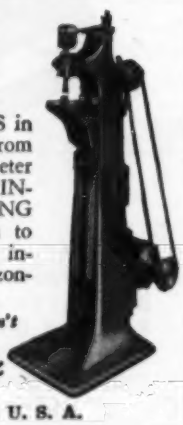
The ETNA MACHINE Co.
2400 MAPLEWOOD AVE. TOLEDO, OHIO

GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to ⅜" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.



BAUMBACH
STANDARDIZED DIE SETS

BETTER-MADE
DIE SETS
AT LOWER COST

46 Styles—195,000 Sizes

E. A. BAUMBACH MFG. CO.
Machined Steel Semi-Steel
Send for our new catalog
1812 South Kilbourn Ave., Chicago, Ill.

PRESSES
FEEDS
AUTOMATIC EQUIPMENT
THE V & O Press Co.
HUDSON, N. Y.

DANLY
PRECISION DIE SETS
DANLY MACHINE SPECIALTIES, INC.
2100 S. 52nd Avenue, Chicago, Ill.
MILWAUKEE • LONG ISLAND CITY, N. Y.
DAYTON • DETROIT • ROCHESTER
CLEVELAND • PHILADELPHIA
Duncannon Metals & Supply Co.
Los Angeles • San Francisco

THEIR PRECISION
Means Greater Accuracy In Your Production
Danly Commercial Sets
Danly Special Sets
DANLY
DIEMAKERS' SUPPLIES

NEED CONTRACT WORK?

Investigate the possibilities offered you through advertising in the CONTRACT WORK SECTION!

For details, write

DEPARTMENTAL STAFF
American Machinist, 330 W. 42nd St., New York 18, N. Y.

NEW HYDRA-CUT FEATURES..

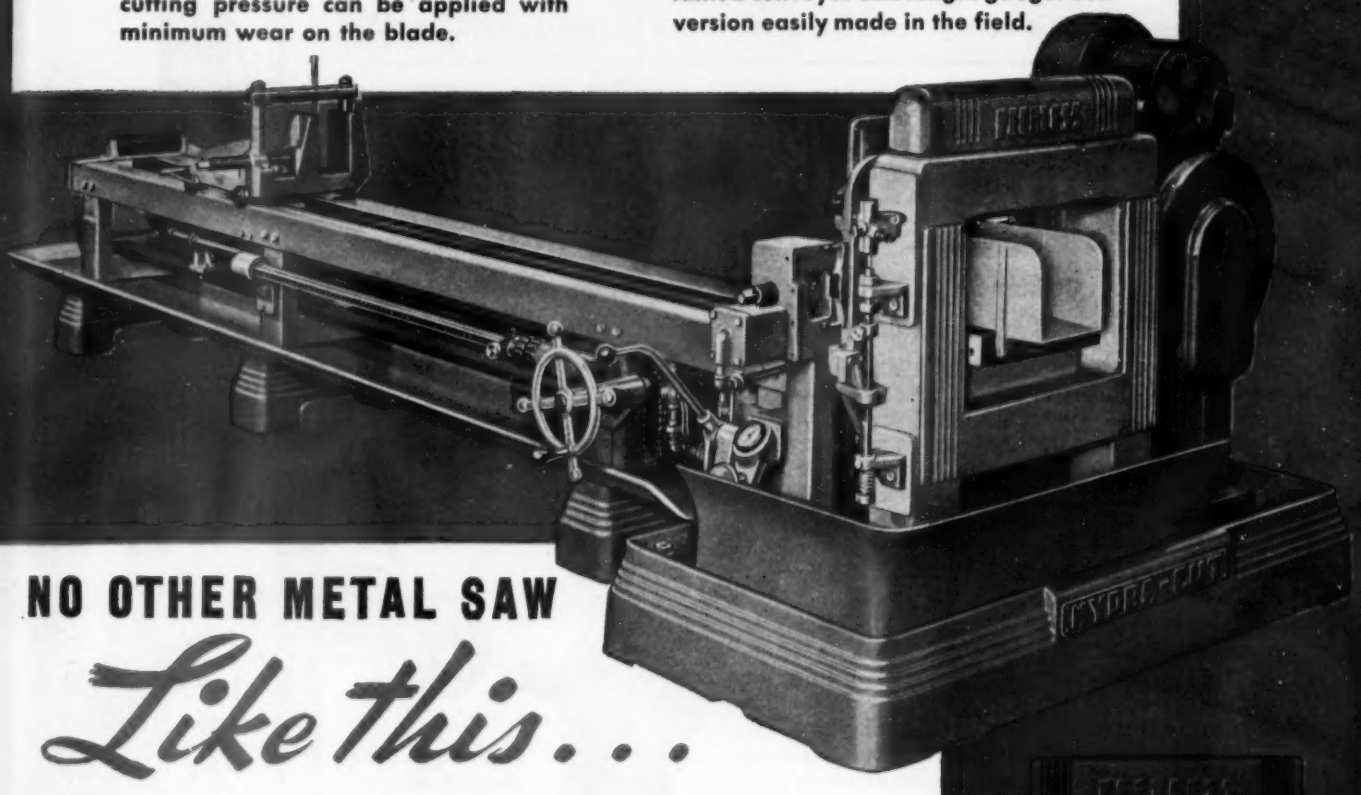
Check them NOW!

✓**SAVINGS**—25% longer sustained cutting accuracy! 33% higher cutting speed! 33% longer blade life!

✓**FEED PRESSURE CONTROL**—Finger-tip Vernier adjustment of feed pressure to the fraction of a pound. Maximum cutting pressure can be applied with minimum wear on the blade.

✓**COOLER CUTTING**—Self-Cleaning Coolant Pump. 75% more coolant capacity.

✓**CONVERTIBLE**—The Hydra-Cut is convertible for single or multiple-bar, automatic cutting, by adding a self contained conveyor and length gauge. Conversion easily made in the field.

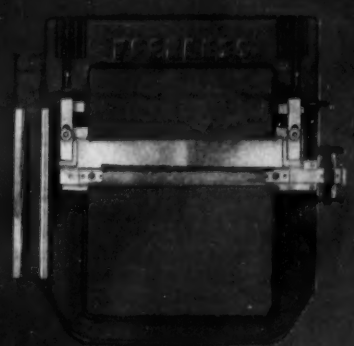


NO OTHER METAL SAW

Like this...

New cutting accuracy and still higher cutting speeds are assured with the Peerless Hydra-Cut! It has the patented Peerless girder-type Four-Sided Saw-Frame which has distinguished Peerless Saws throughout industry. The Backing-Plate Blade-Support fully surrounds the blade and the work, gives added rigidity, prevents bowing, and lengthens blade life. The Saw-Frame is fitted with double-feed cylinders. Saw-Frame and Guide operate on hardened and ground inserts.

Ask for the new Hydra-Cut catalog. It explains these and many other features which speed up metal cutting and lower production costs.



• *Only Peerless Metal Sawing Machines have the Four-Sided Saw-Frame that surrounds the Blade and the Work.*

PEERLESS MACHINE COMPANY, *1600 Junction Ave., Racine, Wis.*
Builders of Fine Tools for Thirty Years

PEERLESS

Metal Cutting Saws

FAST ACCURATE CUTTING DEMANDS PEERLESS BLADE CONTROL

Peerless Machine Co., Dept. AM-244, Racine, Wis.
Send the new 12 page catalog, giving specifications, cutting time estimates, and average blade life of the Hydra-Cut.

Company _____

Individual _____

Street _____

City _____ State _____

A flexible machine that is the last word in simplicity of operation

HI-SPEED
HONING and LAPPING MACHINE

for use with any standard make honing head

HONES CYLINDERS up to 20" in diameter . . . with STROKES from 20" to 72" . . .

IDEAL FOR PRODUCTION JOBS INVOLVING:

Aircraft parts . . . Ordnance parts . . . Diesel engines . . . Compressors . . . Pumps . . . Internal combustion engines . . . Steam cylinders, etc.

Speed up war work involving internal cylindrical surfaces by utilizing a HI-SPEED Honing Machine. When used with proper honing head of any standard make, the HI-SPEED machine produces accurate, straight, round, smooth bores—amazingly fast.

Unique positive stop and dwell system makes it possible to stop the spindle without shock or impact at the bottom of each stroke, at any point within the stroke range and hold the spindle without reciprocation, at that point up to 1½ minutes. Ideal for "blind hole" honing and straight line lapping or honing.

All controls are located at the front of the machine at the operator's station . . . No ladders to climb . . . Stroke setting, hone withdrawal, short stroking at any point, changes in speed of reciprocation or rotation of the spindle made instantly from operator's station.

The HI-SPEED Honing Machine is made in 4 sizes, any one of which can be had with strokes up to 72" . . . Designed for use with any standard make of honing head.

Tell us your requirements—and our engineers will promptly furnish you with complete information, prices and early delivery dates.

Illustrated is No. 0 Machine equipped for 36" stroke with 80" under the spindle.

NOTE THESE SPECIFICATIONS:

Model No.	No. 0	No. 1	No. 2	No. 3
Stroke (standard)	20"	30"	48"	72"
Working Base Area (standard) . . Auxiliary Tables available	21" x 22"	31" x 31"	31" x 31"	48" x 54"
Height Under Spindle Nose (up) . . Added Height Available on Order.	48"	60"	75"	100"
Spindle Diameter	2⅛"	2¾"	2½"	2¾"
Spindle Speeds Through Gear Box	4	4	4	8
Main Drive Motor (standard)	7½ hp	10 hp	15 hp	20 hp
Coolant Pump Volume, Motor Driven	14 gpm	18 gpm	18 gpm	25 gpm
Maximum Bore possible to hone with standard spindle drive motor . .	10" Dia.	12" Dia.	16" Dia.	20" Dia.
Maximum Overall Diameter of Cylinder possible to place on standard base	18"	27"	27"	44"
Floor Area	44"x60"	60"x80"	60"x80"	60"x108"
Overall Height	11'0"	15'3"	18'3"	23'8"

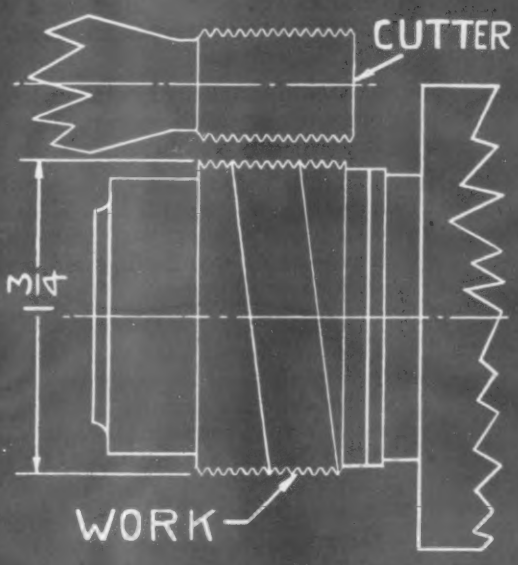
ARMY E NAVY

Over our factory flies the ARMY-NAVY "E"—awarded for excellence in the production of machinery and tools vitally needed to win the war.

AUTOMOTIVE MAINTENANCE MACHINERY CO.
2100 Commonwealth Avenue, North Chicago, Illinois

PLAN-O-MILL

Does it . . . with TWICE *the Speed—* HALF *the Manpower*



We've said it before. We say it again. Obsolete machines are wasteful.

Notice the relatively small, solid, low-cost cutter used to mill this external thread. Plan-O-Mill rapidly and accurately mills this sextuple thread in a single revolution of the milling cutter around the work!

For thread milling, for cylindrical forming—internal or external—Plan-O-Mill delivers outstanding accuracy, superior finish, and most profitable production. One operator handles two or more Plan-O-Mills.

Replace those obsolete machines with Plan-O-Mills! Contact your machinery dealer or write direct.

"FIRSTS" WITH PLAN-O-MILL

First **to install General Electric's remarkable new Thy-mo-trol electronic feed control!**

First **planetary to mill external threads with standard multiple thread cutter!**

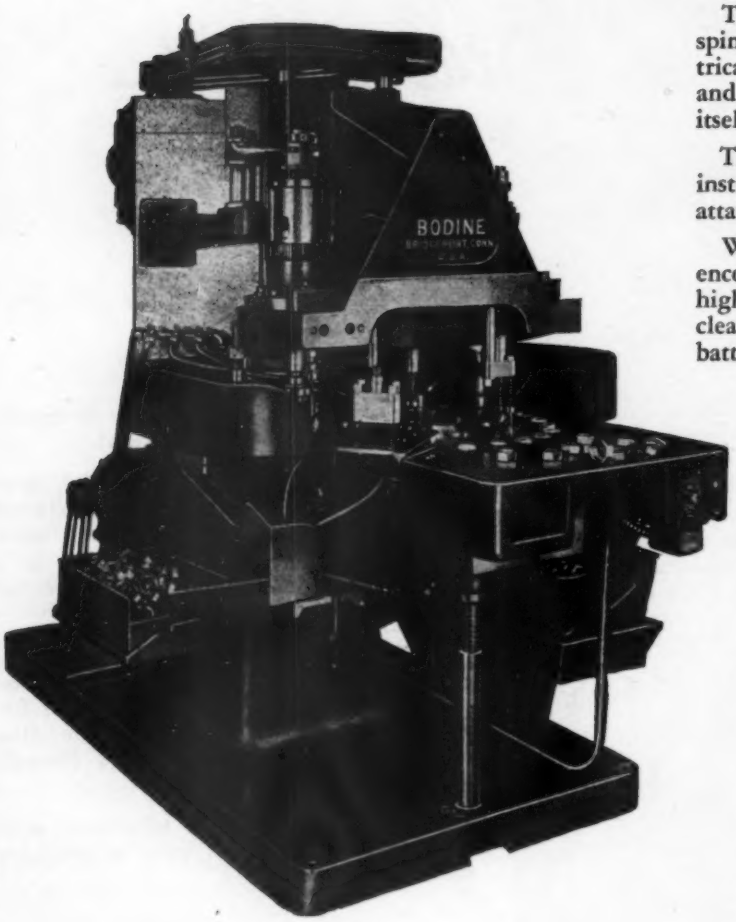
First **planetary to coordinate feeds and speeds!**

First **to provide absolute control of feed-in!**

PLAN-O-MILL
CORPORATION

1511 East Eight Mile Road • Hazel Park, Michigan

an *ANSWER* to Manpower Shortage



The basic principle of Bodine design . . . multiple spindles, horizontal dial, automatic indexing and electrical interlocks . . . permits high speed with accuracy and full protection to the work, the tools, the machine itself — and the operator.

The mechanical simplicity is what makes it so easy to instruct operators, especially women, so that they quickly attain high performance ability.

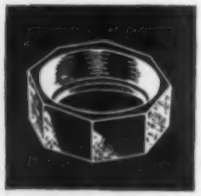
With a battery of Bodines, in charge of one experienced machinist, all operators can maintain unusually high production schedules. War plant experience has clearly demonstrated that Bodines aid greatly in combatting manpower shortage.

There are six standard sizes, each factory-adaptable to many types of repetitive production. Dials may be changed, spindles relocated, and set-ups made to permit operation of tools VERTICALLY, HORIZONTALLY, DIAGONALLY and even from INVERTED positions . . . or from all planes simultaneously during one cycle of the dial.

The smaller machine (54" x 60" floor space) carries 2-¼" taps, 4-¼" drills. The larger size (90" x 96" floor space) is equipped with 2-½" taps, 6-½" drills. Maximum vertical stroke ranges from $\frac{13}{16}$" to 3½" in the 6 sizes.

DRILLING, MILLING, TAPPING, SCREW INSERTING *Simultaneously*

When required, Bodine can adapt your machine to include screw inserting as well as, and in conjunction with, standard operations. Details on request.



A TYPICAL OPERATION

To drill and thread this ¾" malleable iron pipe union nut, heavy duty spindles (2 of each) are provided. The collapsible taps produce the thread in minimum time. Operations: Ream 2 diameters and seat, tap $1\frac{29}{64}$" — 12 T.P.I. Even semi-skilled operators obtain maximum production.

OPERATION

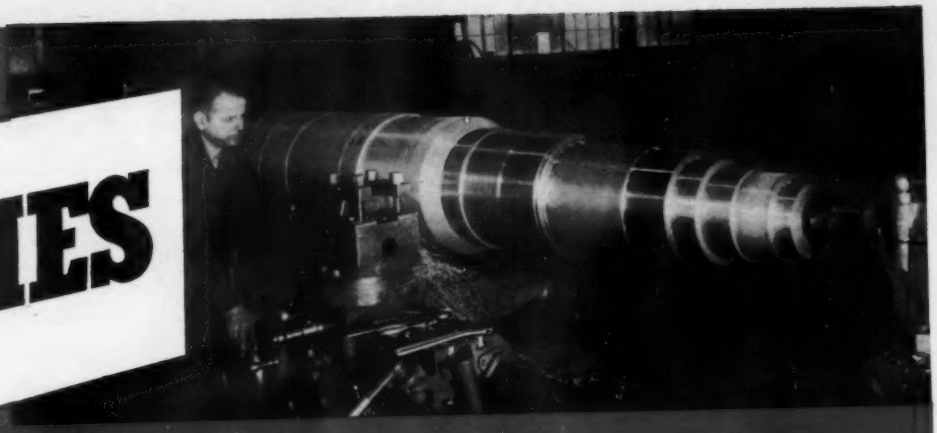
Small parts are hand fed (sometimes hopper fed) to fixtures on the dial which automatically indexes to vari-located work stations. Ejection may be either manual or automatic depending upon the nature of the part. In one typical set-up, 7 pieces per minute were produced, with 7 distinct operations on each piece . . . a saving of 75% in manpower and conserving about 50% in floor area over previous methods.

Bodine operation is clean, simple work which can be performed by women and older men at low fatigue factor.

SEND US YOUR SAMPLE PARTS

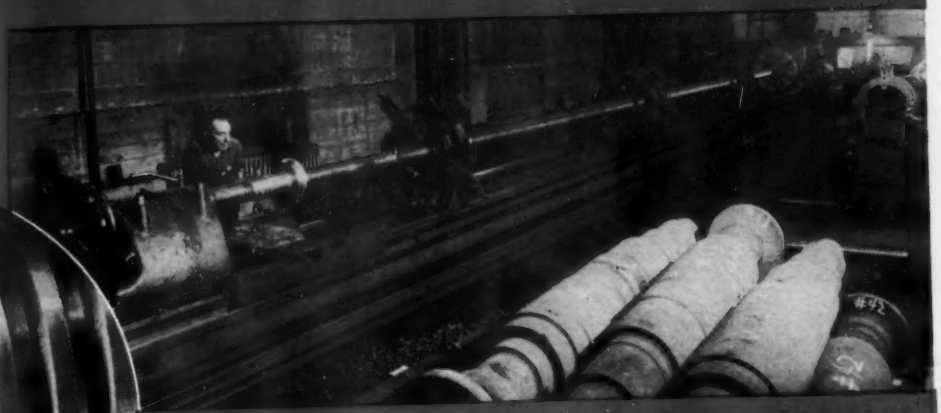
Our engineering department will gladly make recommendations from sample parts or blueprints. Take this opportunity now to speed up and improve your small part production.

THE **Bodine** CORPORATION
BRIDGEPORT CONNECTICUT
AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING AND SCREW INSERTING MACHINES

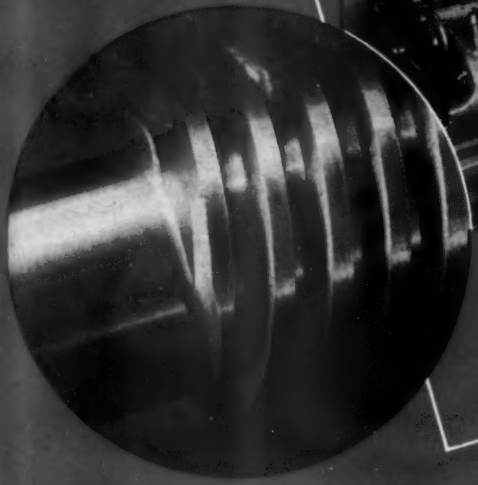


Turning a 4½ ton shaft on a Sommerfeld Heavy Duty 32 inch Lathe. Tolerances —.000", +.001"

LATHES



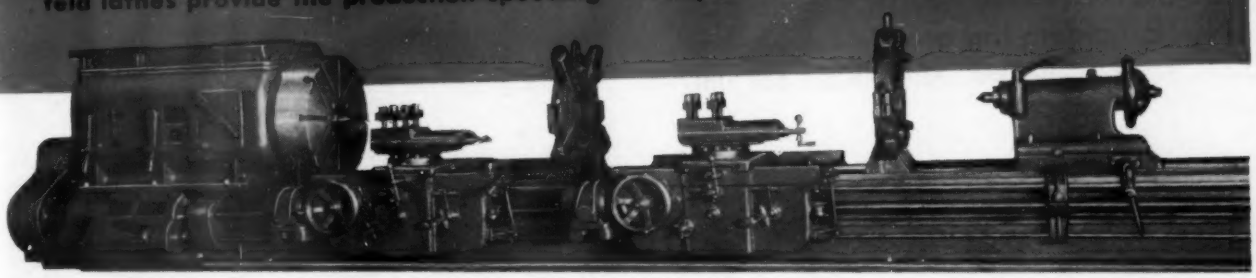
Cutting a triple thread 47 feet 6 inches long. By using a triple tool, all three threads are cut simultaneously. (Below) Close-up of the screw.



for boring and turning

For fast roughing and accurate finishing, Sommerfeld Lathes are offered in sizes from 27 to 60 inches, inclusive, with beds of any length. The photographs above show some of the exacting jobs performed by Sommerfeld lathes.

In the larger sizes (36 to 60 inch) Sommerfeld lathes provide the production-speeding advantage of simultaneous boring and turning. These operations are performed independently, the carriage for outside turning being driven by the Lead Screw, and the Boring Bar by the Boring Screw, at approximately one-sixth the rpm of the Lead Screw. Write for bulletins containing complete information.



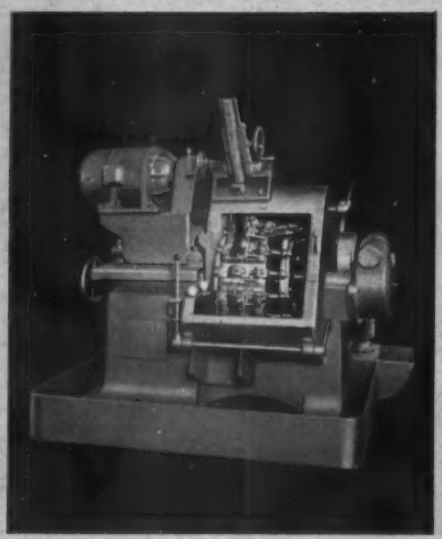
Sommerfeld 36 inch, extra heavy duty boring and turning lathe.

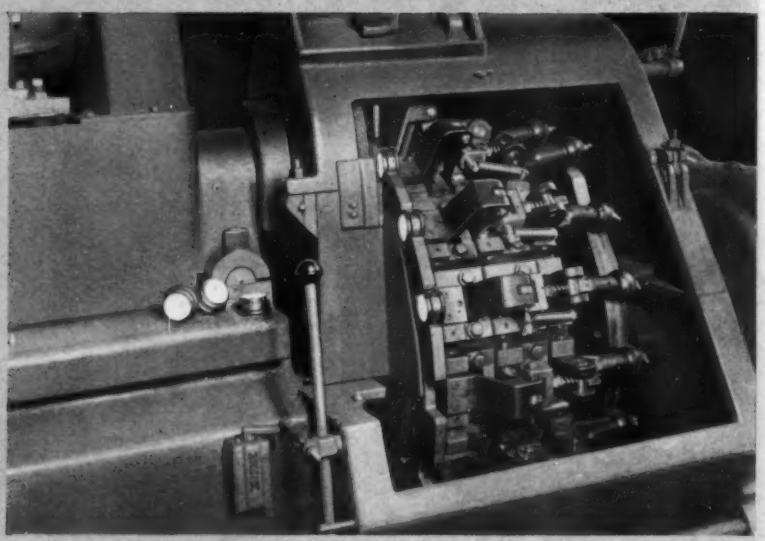
Sommerfeld

MACHINE COMPANY · *BRADDOCK, PA.*

FOUNDED 1895

Grind your small flat surfaces *semi-automatically*-HERE'S HOW!





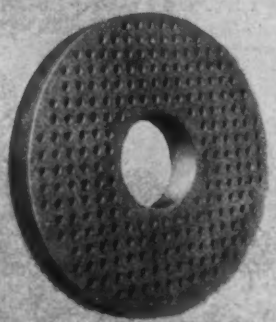
FOR a great many small single-surface operations — like the shell parts seen above, for example — a Gardner No. 122-20" Semi-automatic Grinder is the ideal solution.

Carrying either a rotary-type work carrier, as shown here, or a revolving drum upon which fixtures are mounted, this machine turns out excellent production, and close accuracies.

These shell parts are steel, and are loaded by hand into automatically-clamping work-stations, unloading by gravity. PRODUCTION: 20 to 25 pieces PER MINUTE, holding the ground face within .001" for parallelism, and .005" for uniformity.

Check the possibilities of this type of GARDNER GRINDER—
WRITE FOR FULL DETAILS!

Use
GARDNER GRINDERS
and
WIRE-LOKT ABRASIVES
on *your* flat surfacing operations!



ARMY E NAVY

GARDNER MACHINE COMPANY
410 East Gardner Street . . . . Beloit, Wisconsin, U.S.A.

ANNOUNCING

BARNESDRIL *hydraulic production*

Drilling, Reaming and Facing Units

(Above) Two-Spindle **BARNESDRIL** *No. 10 Hydraulic Production Drilling Machine arranged for drilling and counterboring 12 holes in propeller shafts.*

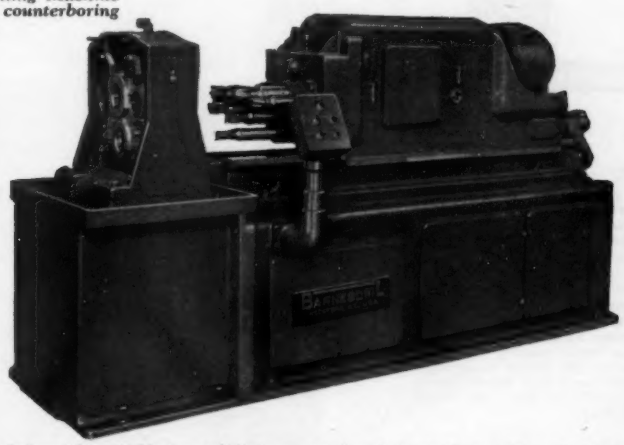
Used in Any Vertical, Angular or Horizontal Position or for Grouping Around Indexing Table... *furnished as complete machine unit for either drilling, boring and facing or tapping operations*

BARNESDRIL, builders of the popular Hydram Hydraulic Drilling Machines and self-oiling, All-Geared Production Drilling and Tapping Machines, has developed these new special Hydraulic Production Drilling Units. Furnished complete with a single motor driving the spindle rotations and hydraulic pump for any required automatic hydraulic feed cycle, these units present a fast, low-cost method for specialized high production drilling, reaming and facing operations—also for boring or for tapping as required.

3 Sizes Available

These new units are regularly available in the following three sizes, motorized according to the requirements of the job:

No. 5 Unit..... with 5 to 7½ hp. Motor.
No. 10 Unit..... with 10 to 15 hp. Motor.
No. 20 Unit..... with 20 to 25 hp. Motor.



(Above) No. 10 Horizontal Unit arranged with 8-spindle Auxiliary Head for facing and counterboring 8 bosses simultaneously on Airplane Engine Parts.

How to Adapt These Units to Meet Your "Special" Drilling or Similar Requirements...

The possibilities for developing these units into high-production machines are practically unlimited. They may be used in any one, or combinations of vertical, angular, or horizontal positions, and are ideally suitable for grouping around a hydraulic indexing table for progressive operations. Each unit has a Flange Support for mounting interchangeable Auxiliary Heads of any desired number and arrangement of spindles.

These units can be furnished suitably mounted on the proper columns, horizontal beds, supports, hydraulic indexing tables, and other elements as a complete machine in itself. These units can also be easily and economically converted from one arrangement to another to meet future requirements.

Let **BARNESDRIL** engineers show you how to adapt these new Hydraulic Drilling Units to your work. There is no obligation.

Get Complete Facts on These New Units

Send today for complete details and specifications of these new Drilling Units. Find out how these Units can be adapted to your work.

Barnes Drill Co.

830 CHESTNUT STREET
ROCKFORD
ILLINOIS, U. S. A.

Joe:

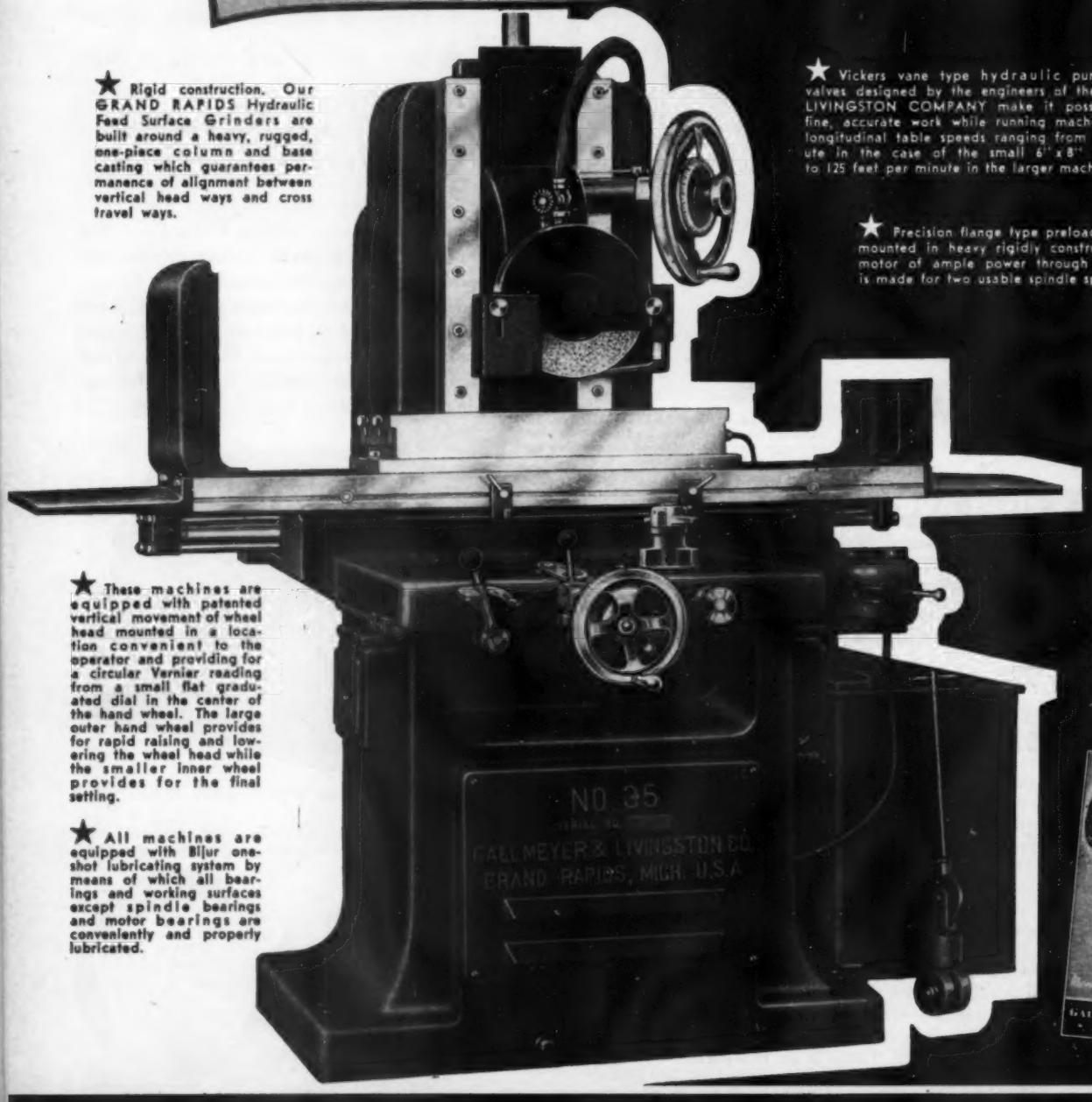
HERE IS WHY PRECISION SURFACE GRINDING IS NO LONGER THE BOTTLE NECK IN YOUR TOOL ROOM

Bill

★ Rigid construction. Our GRAND RAPIDS Hydraulic Feed Surface Grinders are built around a heavy, rugged, one-piece column and base casting which guarantees permanence of alignment between vertical head ways and cross travel ways.

★ Vickers vane type hydraulic pumps and control valves designed by the engineers of the GALLMEYER & LIVINGSTON COMPANY make it possible to produce fine, accurate work while running machines at maximum longitudinal table speeds ranging from 80 feet per minute in the case of the small 6" x 8" capacity grinder to 125 feet per minute in the larger machines.

★ Precision flange type preloaded ball bearing spi mounted in heavy rigidly constructed head is drive motor of ample power through vee-belts and provi is made for two usable spindle speeds.



★ These machines are equipped with patented vertical movement of wheel head mounted in a location convenient to the operator and providing for a circular Vernier reading from a small flat graduated dial in the center of the hand wheel. The large outer hand wheel provides for rapid raising and lowering the wheel head while the smaller inner wheel provides for the final setting.

★ All machines are equipped with Bijur one-shot lubricating system by means of which all bearings and working surfaces except spindle bearings and motor bearings are conveniently and properly lubricated.

★ If you are int in modern high Hydraulic Feed Grinders in which room accuracy is com with production we suggest that y for bulletin GL-100

GALLMEYER & LIVINGSTON C

3330 STRAIGHT AVE. S.W.

GRAND RAPIDS, 4 MICHIGAN

50 YEARS YOUNG

Fifty years of effort in the design, development and improvement of metal working equipment prepared Baush for the part it is playing in the present emergency.

The Army-Navy "E" Flag proudly waving over the Baush plant symbolizes the youthful, undaunted spirit which is guiding our war production efforts.

Always a pioneer*, Baush is performing a vital service today in helping to supply the urgent needs of the war production plants and thus pave the way for an early, permanent peace.

Baush is happy to be 50 years young and able to do its bit for the cause of the Allied Nations.

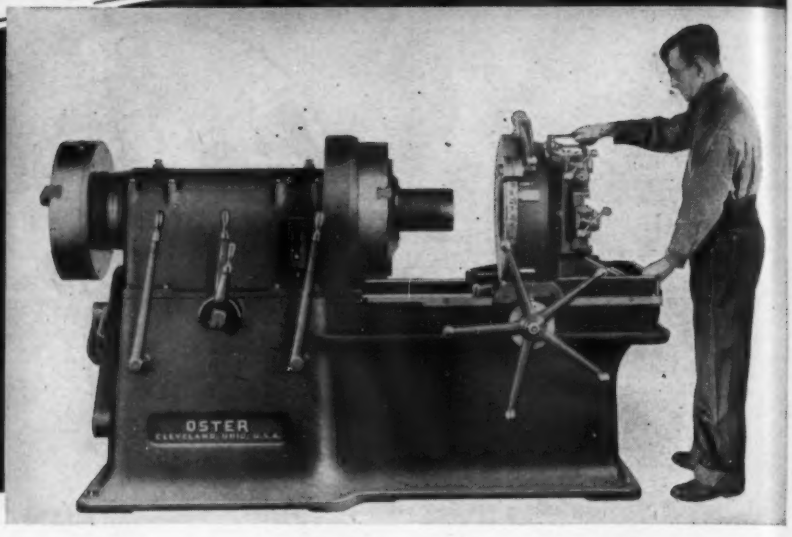
*Pioneers in Multiple Drilling, Tapping and Boring Machines as well as special equipment for the metal working field.

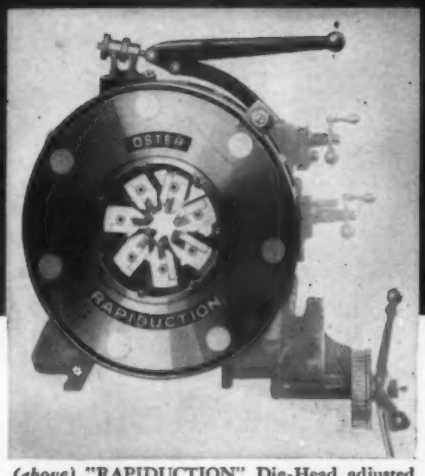
BAUSH MACHINE TOOL CO.

Springfield, Mass. · Detroit, Mich.

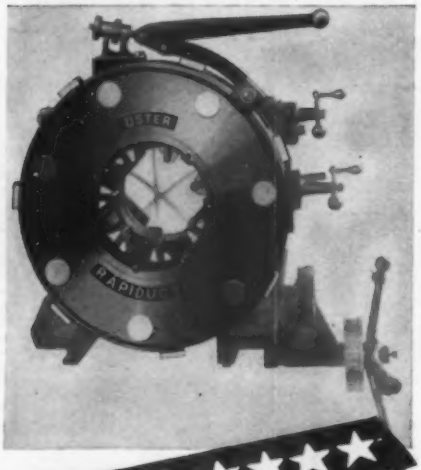
"Rapiduction"

HIGH SPEED PIPE THREADING





(above) "RAPIDUCTION" Die-Head adjusted to thread smallest size within range.
(below) The same "RAPIDUCTION" Die-Head adjusted to thread largest size within range.



Quickly Adjustable, Single Die-Head Threads Complete Range of Each Machine

WITH NEVER A DIE-HEAD CHANGE!

● The "RAPIDUCTION" Die-Head is one of 15 important features of Oster "RAPIDUCTION" high speed, high production power threading machines.

The "RAPIDUCTION" Die-Head with one set of holders covers the entire range of each machine and a single set of high speed steel chasers threads all sizes of American National Pipe Threads where pitch and taper are the same. Any one or more chasers in the set can be replaced without renewing the entire set.

Three Sizes of "RAPIDUCTION" Machines

No. 6-A: Pipe range: 1½" to 6". Bolt range: 1" to 2".
No. 8 : Pipe range: 2½" to 8". Extra range: 1½" & 2".
No. 12 : Pipe range: 3½" to 12". Extra range: 2½" & 3".

Typical "RAPIDUCTION" Speeds

No. 6-A threads 1½" pipe in 11.3 seconds; 3 inch pipe in 25.3 seconds. No. 8 threads 6" pipe in 66 seconds. No. 12 threads 8" pipe in 86.7 seconds; 12 inch pipe in 190 seconds. Other sizes of pipe in range of each machine are threaded at comparable high speeds.

Write for illustrated Catalog No. 43.

OSTER MACHINES
Save Money
to Help You Buy
WAR BONDS

OSTER

THE OSTER MANUFACTURING COMPANY • 2049 E. 61ST St. • Cleveland, O. • U.S.A.

L-W

HIGH SPEED POWER HACK SAWS
LOW PRICE · · · HIGH QUALITY

The Ideal Saw for any Shop
GRAVITY FEED
LENGTH GAUGE
EXPANDING CLUTCH
DOVETAILED SAW FRAME GUIDE

BUY
WAR
BONDS

• Automatic trip stops the machine on completion of cut.
Automatic Relief of the saw blade on the non-cutting stroke is also provided.
Capacity 6" x 6" with 10" to 14" blades . . . Clutch Pulley 12" x 3" . . . speed of pulley 120 R.P.M.
This heavy duty Power Hack Saw is highly efficient and accurate in operation. The Saw Frame is so designed that maximum rigidity is obtained. The sliding bearing is dovetailed to fit the arm and is adjustable in all directions. Belt drive, only $180.15.
Furnished, on request, is the 3-speed V-belt Motor Drive Arrangement . . . permits three speeds varying from approximately 90 R.P.M. to 130 R.P.M.; less motor—$25.90.
Motor recommended for use with drive arrangement—½ H.P. standard speed 1725 R.P.M.

Immediate Delivery

L-W CHUCK Company
1-7 N. ST. CLAIR ST., TOLEDO, O.

Also manufacturers of
Demagnetizers
Lathe Chucks
Magnetic Chucks
Milling Machine Vises
Dividing Heads

NEW BULLETIN DESCRIBES W-S STRAIGHTENING AND BENDING PRESSES

This 50-ton Hydraulic Straightening Press is used for straightening complicated parts — such as crankshafts and propeller blades. It is described and illustrated in this new bulletin now available to engineers. The press is self-contained, of the open-gap type and it is equipped with double-acting cylinder and a sensitive single lever press control for accurate bending and straightening. The cylinder is adjustable at right angles to the table movement, making it possible to apply the pressure on any point of the table. Work table is movable along bed of machine by means of hand-wheel, permitting accurate location of heavy pieces under the ram without moving the work. The Watson-Stillman Co., Roselle, N. J.

This 50-ton Straightening Press provides a 24 in. stroke, with ram 7 in. in diameter, exerting a pressure of 2750 lb. per sq. in. The machine is 35 in. wide, 12 ft. long. The bed measures 12 ft. by 35 in.

Ask for your copy of Bulletin No. 320-A
It contains information and technical data on Moving Table Presses • Stationary Table Presses • Column Type Stationary Presses • Column Type Moving Cylinder Presses • Horizontal Table Type Single and Double Ram Presses • Horizontal Table Type Bull Dozers • Portable Pipe Benders • Portable Shaft Straightener • Portable Ship Frame Bender • Casting Straightening Presses • Specifications and Engineering Tables for all types are included.

WATSON-STILLMAN

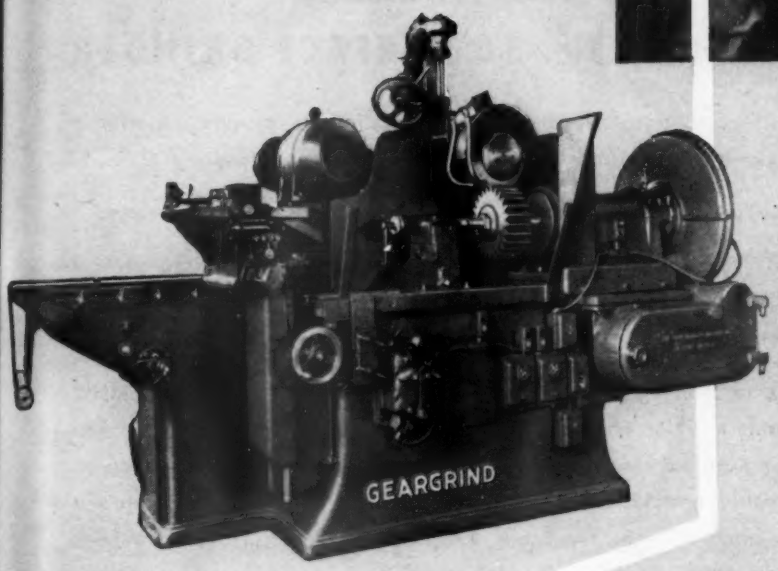
Designers and Manufacturers of Hydraulic Equipment, Forged Steel Fittings, and Valves.

FORMED WHEEL GRINDING

for Better

GEARS · RACKS AND SPLINES

COURTESY LODGE & SHIPLEY MACHINE TOOL CO.



TYPE GG-23-C
24" External Diameter
Gear Grinding Machine

GEARGRIND Machines are responsible for outstanding production records—turning out gears, splines and racks in which required tolerances are easily met, at a speed that insures uninterrupted schedules. There are GEARGRIND Machines that grind gears up to 72" in diameter, and splined shafts and pinions up to 80" in length.

In addition to continuous production, however, GEARGRIND Machines and Formed Wheel Grinding are ideal for producing master gears, spline gauges, spline work arbors, plug gauges, punches and dies, cluster gears and gears of cramped design, as well as general tool room work.

Our general catalog describes the complete line of GEARGRIND Machines for the Formed Wheel Grinding of external and internal gears, external and internal involute splines, straight splines, serrations and racks, as well as special machines for special jobs—worm grinders, slot grinders, and groove drilling machines.

The GEAR GRINDING MACHINE COMPANY
DETROIT 11, MICH. U.S.A.

Surfacing Time Reduced 80%

BY HANCHETT No. 36 SURFACE GRINDER

Hanchett Vertical Multiple Spindle Rotary Grinder is equipped with two grinding heads instead of one. Work receives two cuts in one setting. Write for details.

Ask For Catalog No. 170A-4.

THE JOB: Cleaning one surface of pedestal castings to provide a perfectly flat base from which to perform subsequent machining operations.

FORMER METHOD: Milling machine. Time required, 20 minutes per piece.

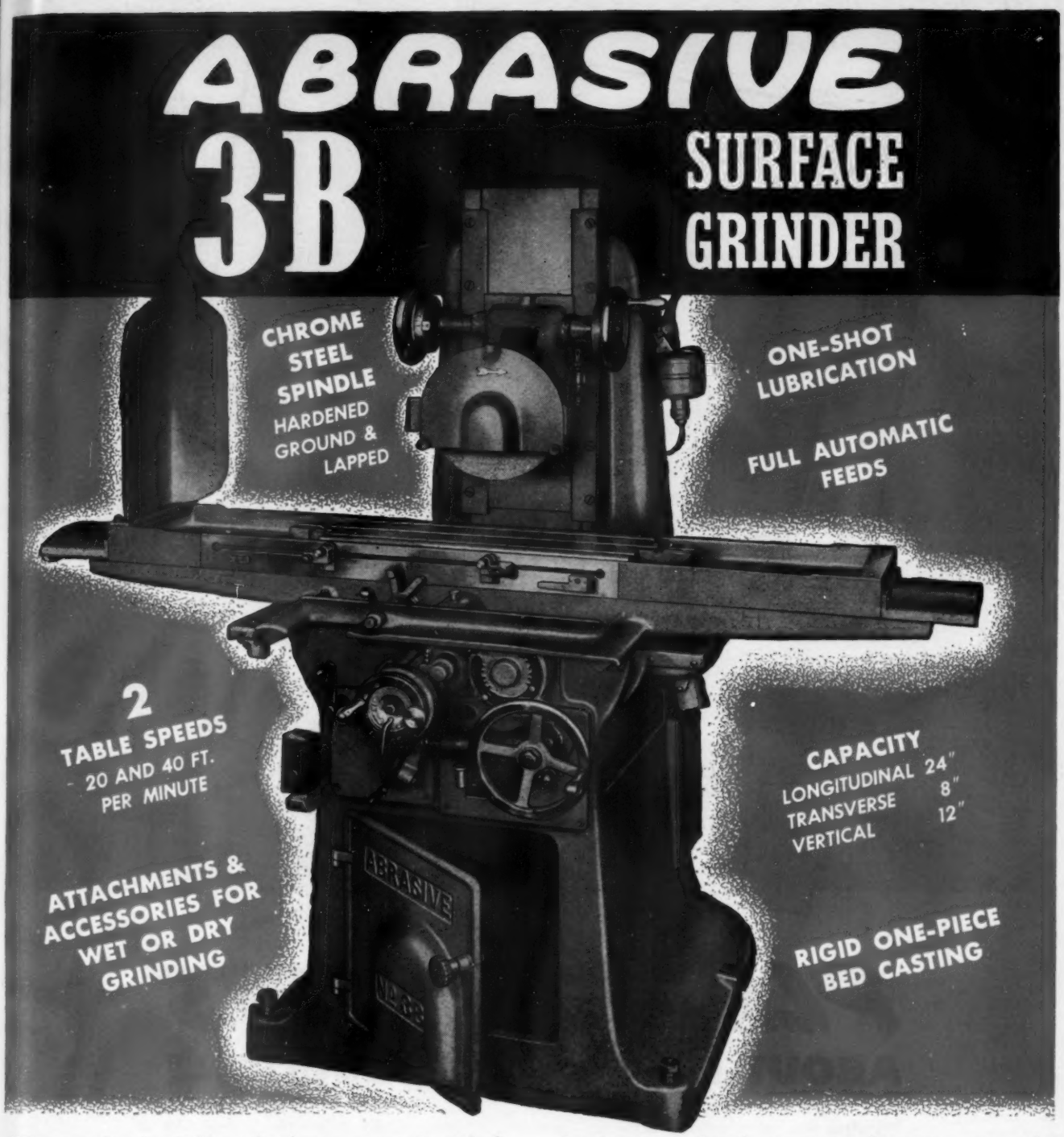
PRESENT METHOD: Castings are surfaced on a Hanchett No. 36 vertical Spindle Rotary Grinder. Time required, *4 minutes, or less,* per piece—an 80% saving in time over the former method.

This is a typical example of the manner in which Hanchett Grinders are daily saving valuable machine time and man-hours on countless vital jobs . . . If you are not getting desired results on some of your operations perhaps they can be performed better and faster on a Hanchett. "If it's a flat surface there's a Hanchett to grind it." — Rotary Table, Reciprocating Table, Traveling Wheel, Plano Cylinder Wheel and Disc Grinders. Consult our engineers—they will recommend the *type* of grinder best suited to the job.

IF IT'S A FLAT SURFACE—THERE'S A HANCHETT TO GRIND IT

HANCHETT MANUFACTURING CO.
BIG RAPIDS, MICHIGAN U.S.A.

ABRASIVE 3-B SURFACE GRINDER



Whenever there's grinding to be done on a war-time schedule, the high precision and automatic features of the ABRASIVE No. 3B Surface Grinder are maintaining accuracy and saving precious minutes. Its mechanical operation insures continued accurate performance even under the difficult conditions encountered at sea. No. 3B performs aboard the Navy's seagoing shops—the auxiliary repair ships . . . with the same efficiency as in shops ashore.

TODAY this highly accurate and dependable surface grinding machine is serving the production needs in many war plants. TOMORROW the accuracy, reliability and production capacity of the 3B grinder will be important factors in peace-time competition.

Send for Descriptive Bulletins

ABRASIVE

ACCURACY BOOSTS PRODUCTION

ABRASIVE MACHINE TOOL CO • EAST PROVIDENCE 14, R. I. • *Dealers in Principal Cities*

PLANER FACTS
ABOUT BIG SCALE PRODUCTION!

Whether you want *speed*—*accuracy*—*greater versatility*—fully *automatic controls*—or all four qualities combined, you'll find just the Planer you need in this new brochure by Liberty. It illustrates and describes Planers sized up to 132" for handling big scale cuttings faster and to closer tolerances than heretofore thought possible, due to Electro-Mechanical Feed . . . Automatic Tool Lifters . . . Forced Feed Lubrication . . . Stationary Screws, Revolving Nuts, etc. Cutting speeds 4 ft. to 133 ft. per min. Ask for Bulletin 156 just off the press, giving detailed specifications on a complete range of Liberty Heavy Duty Planers that are now available. Our Engineering Staff is at your service, without obligation.

LIBERTY PLANERS

HAMILTON, OHIO ★ U. S. A.

Over A Quarter Century of Specialized Experience with Time-Tested Principles of Design

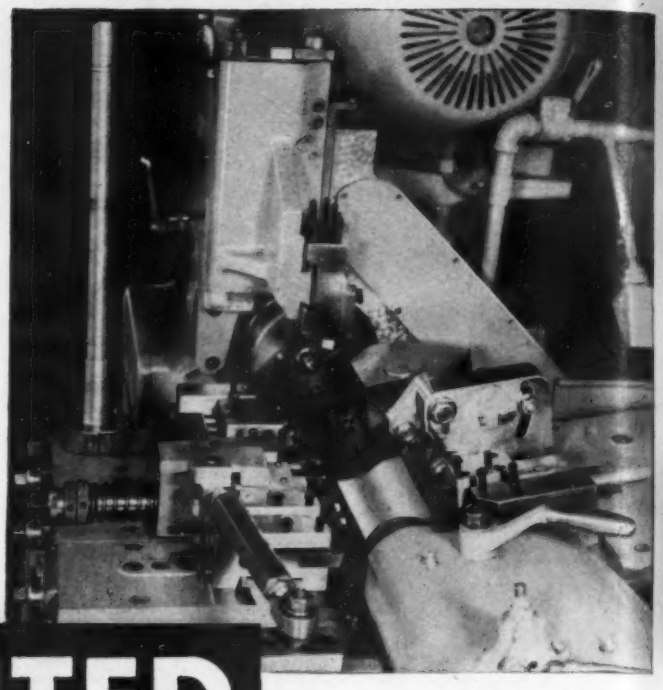
Did you read the Important Announcement by The Bakewell Manufacturing Co. and Warner & Swasey?

SEE PAGE 80

MODEL "LR" *Lo-swing*

Illustration at right shows tooling of a Model "LR" equipped for turning an Automobile Transmission Shaft. Equipment furnished consists of one three-slide Front Carriage; two Back Attachments, one carrying tools, the other a two-roll steady rest; one Top Slide; one 45° Undercutting Attachment.

The automatic cycle is as follows: First, the tools on the center slide of the Front Carriage spot the shaft for a Steady Rest bearing; Second, Steady Rest on Back Attachment moves in automatically to support work; Third, all tools start cutting simultaneously, those on Front Carriage turning all diameters, tools on Top Slide face and groove, tools on Back Attachment chamfer and groove while the Undercutting Attachment tool undercuts the head end at a 45° angle. The operation is entirely automatic. Operator merely loads and unloads and pushes starting lever.



UNLIMITED
TOOLING POSSIBILITIES
ARE AVAILABLE WITH THE LATEST TYPES OF AUTOMATIC *Lo-swing* LATHES

Lo-swing IMP

At left is a close-up illustration of an Imp Lathe equipped for turning, facing and rough and finish grooving aluminum pistons on a production basis.

The work is held and driven by an air-operated Wrist Pin Type Driver. The three tools mounted on the front carriage turn the skirt, ring groove lands, and round the end of the piston, while simultaneously the tools on the top slide face the end and rough turn the grooves. Immediately these tools have ceased cutting, the finish grooving tools on the rear slide finish the grooves to close tolerances.

The cycle is automatic . . . the operator simply loads and unloads the pistons and pushes the starting lever.

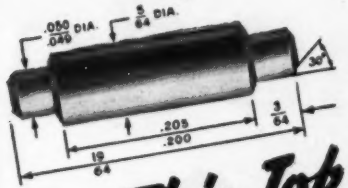
SENECA FALLS MACHINE CO.
SENECA FALLS, NEW YORK

LATHE NEWS *from* SENECA FALLS

On a GORTON 16-A

50,000

Small Parts like this



How This Job Was Done

TOOLING: 4 standard single-point cutters. 4 flat cams.

SEQUENCE OF OPERATIONS:

1—Turn 30° taper 1/64" long and turn 2° to 3° taper 1/32" long to diameter of .0495" (±.0005").

2—Advance headstock .205" and plunge cut for 3/64" diameter of .0495" (±.0005").

3—Turn taper 2° to 3° 1/32" long and turn 30° taper 1/64" long.

4—Cut off finished part.

MATERIAL: 5/64" dia. S.A.E. No. 1060 steel.

PRODUCTION: 10 pieces per minute.

These other typical parts shown actual size

GREATER ACCURACY . . . IMPROVED FINISH

Reduced Grinding Down-Time
Faster, Low Cost Setups

This manufacturer selected the Gorton 16-A Precision Automatic Screw Machine to obtain greater accuracy and improved finish in machining these cam follower pinions—each completed in *one* operation in 6 seconds!

Simple, single-point tools—easy to grind—brought savings in down time required for grinding the forming tool used in previous methods. Rigid construction of the Gorton 16-A—the heaviest Swiss-Type Screw Machine built—enabled precision performance 21 hours daily on production runs of 50,000 parts. Gorton accuracy and Gorton finish eliminated subsequent operations.

Wide Range of Work

The Gorton 16-A produces an almost endless variety of short or long, slender parts — diameters .005" to 7/16", lengths 1/32" to 2¾"—complete in one operation.

It does step turning, generates curves, tapers, back recesses, knurls, chamfers, etc. It centers, drills, slots, threads or taps.

Tool slides are easily accessible. Micrometer adjustments for all tools insure accurate, quick setups at low cost. Centralized finger-tip controls provide infinitely variable spindle speeds (1100 to 10,000 R.P.M.) and infinitely variable cam feeds (20 to 720 pieces per hour; 20 to 1440 optional). No speed or feed gears to change.

GORTON Complete Cam and Tool Service

For Any Make Swiss-Type Screw Machine — Gorton or Others

Gorton exclusively offers a complete cam and tool service. Highly skilled engineers are available to take care of all your needs. This service consists of a detailed cam and tool layout, listing all operations of the machining cycle together with necessary cams, tools, collets and bushings. This service is available at the Gorton factory at Racine, Wis., for the Midwest and Pacific areas; and from Russell, Holbrook, and Henderson (our Eastern Distributors) of New York City for quick service in the East.

GET THE FACTS NOW

Mail Today for FREE Bulletin

GEORGE GORTON MACHINE CO.
1315 Racine St., Racine, Wis.

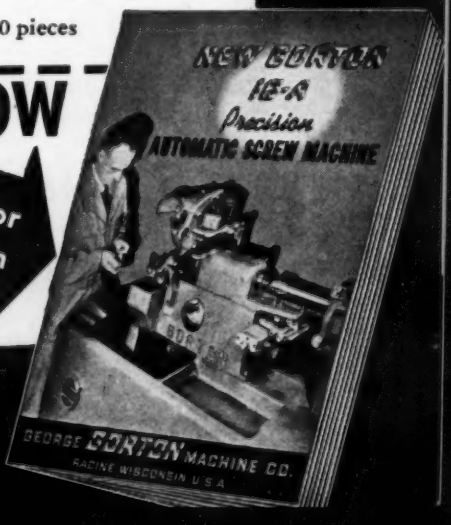
Send me, without obligation, FREE bulletin with complete information covering the Gorton 16-A Precision Automatic Screw Machine.

Name..... *Title*.....

Company.....

Address.....

City..... *State*.....



GORTON
50 YEARS IN PRECISION TOOLS

GEORGE GORTON MACHINE CO.
1315 RACINE STREET, RACINE, WISCONSIN, U. S. A.

SPECIALISTS FOR 50 YEARS IN TRACER-CONTROLLED MACHINES—ENGRAVING, DIE MAKING, VERTICAL MILLING MACHINES

Here's Fast Accurate Economical Thread Cutting

Modern Stationary Type Self-Opening DIE HEADS

embody features that make them ideal tools for general purpose work. Simple yet rugged in construction, they are positive in opening and easily adapted to practically every thread cutting operation within their capacity. All parts are of hardened steel, ground to absolute accuracy. A minimum number of parts reduce wear and make for long life.

Style T Die Heads are made in capacities from 1/8" to 2". Style B Die Heads may be had in capacities from 2 1/2" to 7". Thus, a small investment enables a shop to handle a wide range of thread cutting jobs. For more complete information send for Bulletin M-123.

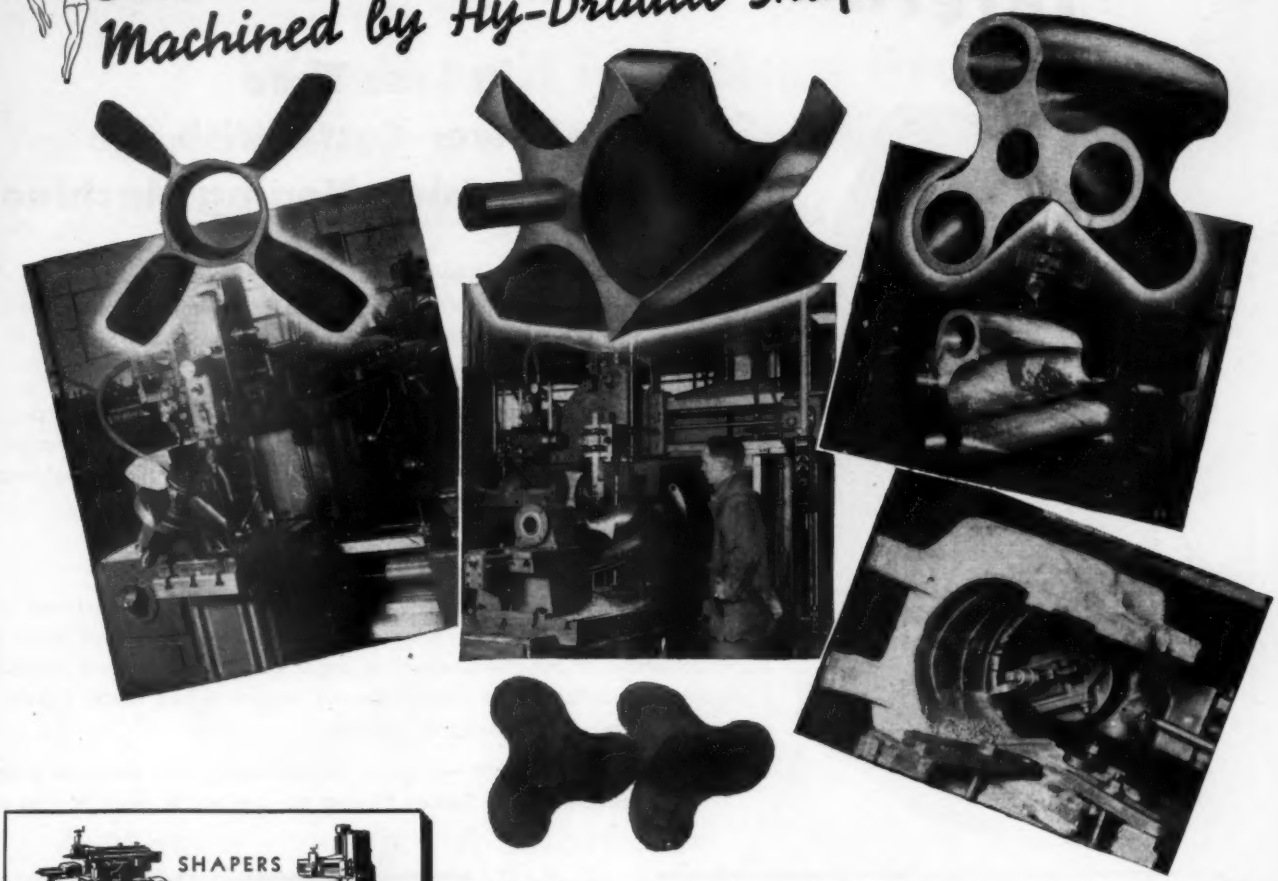
We Can Make Prompt Shipment — What Are Your Requirements?

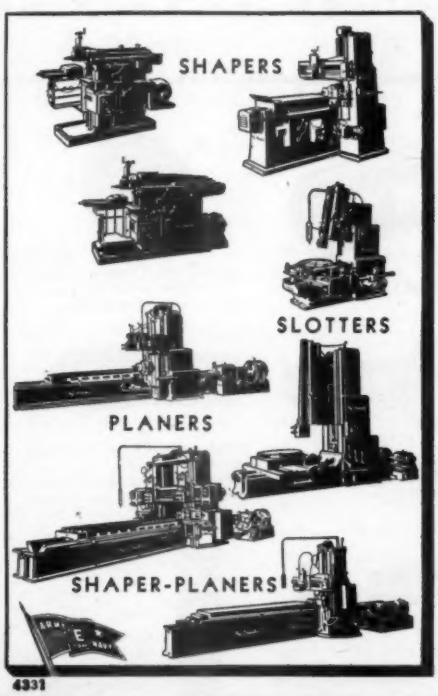
MODERN TOOL WORKS

DIVISION OF
CONSOLIDATED MACHINE TOOL CORPORATION
ROCHESTER 10, NEW YORK

SHAPES, BROTHERS, SHAPES

Machined by Hy-Draulic Shapers and Planers





4331

When you must machine shapes that are neither flat, round, nor suitable for rapid machining by conventional methods; investigate the considerable possibilities in *Hy-Draulic* Shapers and Planers equipped for such jobs. Working from plaster molds, wooden models, or templates; outstanding *Hy-Draulic* features and advantages enable you to machine various forms in metal faster than by other methods. Work-pieces in lots, or in mass production, are machined likewise by duplicating suitable masters. Generated shapes of various kinds also can be produced, by different methods, on *Hy-Draulic* Machine Tools. Pictures herewith indicate some *Hy-Draulic* accomplishments. There are others, hush and hush-hush. The experience of our engineers in this field of machining is yours to command, especially on war work. Write, today, for details. Address Dept. 1107

BUY UNITED STATES WAR BONDS AND STAMPS

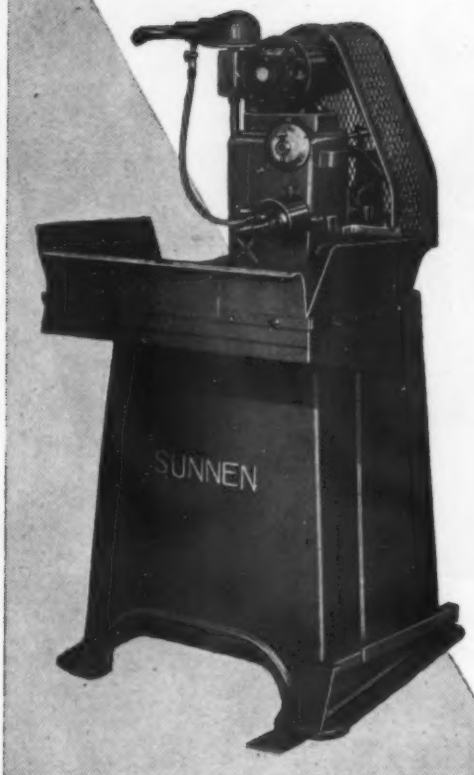
Hy-Draulic
Reg. U. S. Pat. Off.

Shapers..Planers..Slotters..Shaper-Planers

ROCKFORD MACHINE TOOL CO.

ROCKFORD, ILLINOIS, U.S.A.

More Accurate Internal Finishes



in Less Time at a Lower Cost—With the Sunnen Precision Honing Machine

This popular, low-cost machine is guaranteed to hone internal cylindrical surfaces to within .0001" and produce a super-smooth finish of 2 to 3 micro-inches. In actual practice, *accuracy has been held to within .000025" on production jobs.*

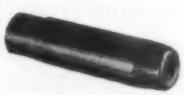
In addition, production has been increased — *in some instances up to 500%* — with fewer rejects and absolute interchangeability of parts. These advantages not only speed production but prevent waste of vital war materials and costly man-hours of production!

Consider These Advantages, Too

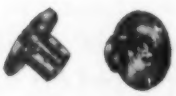
Wide range — the Sunnen Precision Honing Machine handles internal diameters from .185" to 2.625". Relieves big internal grinders for other jobs. Corrects errors of out-of-roundness or taper caused by previous operations. Facilitates duplication of sizes. Does not require skilled labor. Practical — inexpensive — economical to operate.

Write for free bulletin—or ask a Sunnen Engineer to give you complete information on how Sunnen Honing can be put to work in your plant.

Typical Jobs



Cast Iron Valve Stem Guide. ½ to one thousandth removed —220 pieces per hour. Better finish and straighter hole.



Stainless Steel Load Compensator Valve Seat. Hole is honed to .0002" limit.

Idle Valve Guide. Honing after grinding holds a .0002" limit necessary for accurate idling.

Shell Loading Die.

Aircraft Valve Tappet Rollers Honed after grinding to give 100% bearing surface.

Hydraulic Control Bushing. Honing gives straight round hole after rough reaming.

Aircraft Carbureter Operating Valve Sleeve. Sunnen honing eliminates distortion from assembling operation.

Automobile Distributor Shaft Gears. Taper removed at a rate of 80-90 per hour.

Compressor Yoke. Alignment maintained and better finish produced.

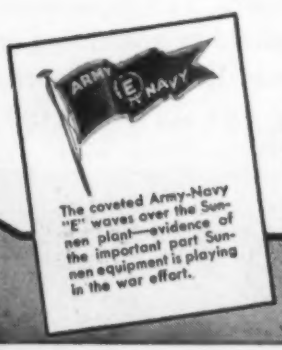
Mild Steel Clevis. Honing corrected errors of previous operations and maintained true alignment of two holes.

Roller Bearing Outer Race. Finish improved from 12 micro-inches to 2 micro-inches.

Bearing. A very small part. 2 micro-inch finish necessary.

Carbureter Idler Pump. Smooth, straight-line finish in blind hole prevents piston leakage.

Ceramic Insulator. Honing used to eliminate roughness inside ceramic tube.



The coveted Army-Navy "E" waves over the Sunnen plant—evidence of the important part Sunnen equipment is playing in the war effort.

SUNNEN

SUNNEN PRODUCTS COMPANY 7941 Manchester Ave., St. Louis, Mo.

Canadian Factory, Chatham, Ontario

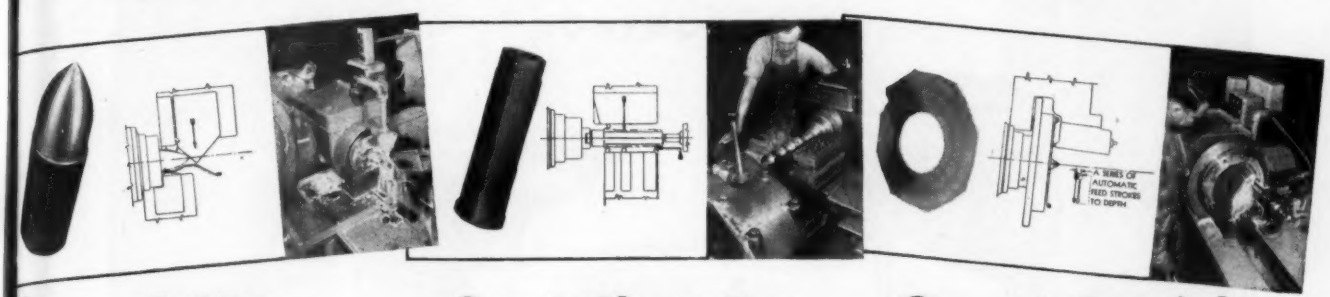
How to Get the Most Economical Solution to Your Turning Problem!

Whether it is a Mass Production . . . a Short Run . . . or a Special Turning Job, Sundstrand Engineers Can Solve It...

Whether your turning problem is a mass production job running into thousands of pieces...a short run of as few as 25 pieces...or a special turning job, Sundstrand Engineers will show you how it can be handled to advantage on Automatic Lathes with quick cycle changeover.

All of the advantages of multiple tool turning are available on both short run and mass production work with Sundstrand Lathes. To meet a wide range of applications three models of Sundstrand Automatic Lathes are available. These standard models, furnished with either two or three tool carriages, can be made even more flexible and adaptable to additional jobs with several available auxiliary attachments.

Described here are three typical cases in which Sundstrand Engineered production assisted plant engineers in designing a tooling method which resulted in higher production and lower turning costs.



1 A Mass Production Job!

Turning 75 mm Armor Piercing Shot . . .

Starting from bar stock the Sundstrand Automatic Lathe contour turns and forms the nose of 75 mm shot. Highly skilled operators are not necessary in order to rapidly and accurately duplicate parts on a Sundstrand. Just load, unload, and press the machine starting lever...the front and rear tool slides will rapid approach, feed, rapid return, and stop, all timed and interlocked with the starting and stopping of the machine spindle and coolant flow. Oftentimes, one operator can run one or more machines, depending upon the cycle time.

2 A Short Run Turning Job!

Turning Time Reduced from 75 to 8 Minutes on Lots of 40 . . .

Due to the quick changeover features of the Sundstrand Automatic cycle, it is possible for this manufacturer to turn many of his jobs in lot sizes as low as 25. On one lot of 40 sleeves, his turning time was cut from 75 to 8 minutes. Other parts turned include sprockets, pulleys, gears, etc., with lot sizes of 25 to 100 pieces. Two Model 10 Sundstrand Automatic Lathes are used with one man operating both machines Over 100 different short run jobs are turned on these machines.

3 A Special Turning Job!

Cutting Spiral Grooves in Cartridge Reels . . .

Sundstrand Engineers designed a number of special features and a unique tooling method for a Model 12 Sundstrand Automatic Lathe in order to provide a complete automatic cycle necessary for cutting a spiral groove on a cartridge reel. Because of the frailness of the part and the odd shape of the groove, it was not possible to cut this spiral groove to full depth in one cycle. The machine is arranged to automatically cycle 35 times and then stop. Tool is advanced .002" between each cycle so that a groove .070" deep has been cut at the end of the 35th cycle.

MORE TURNING FACTS...Get additional information on how you can turn both short run and mass production work faster in this free booklet. Ask for Bulletin No. 121.

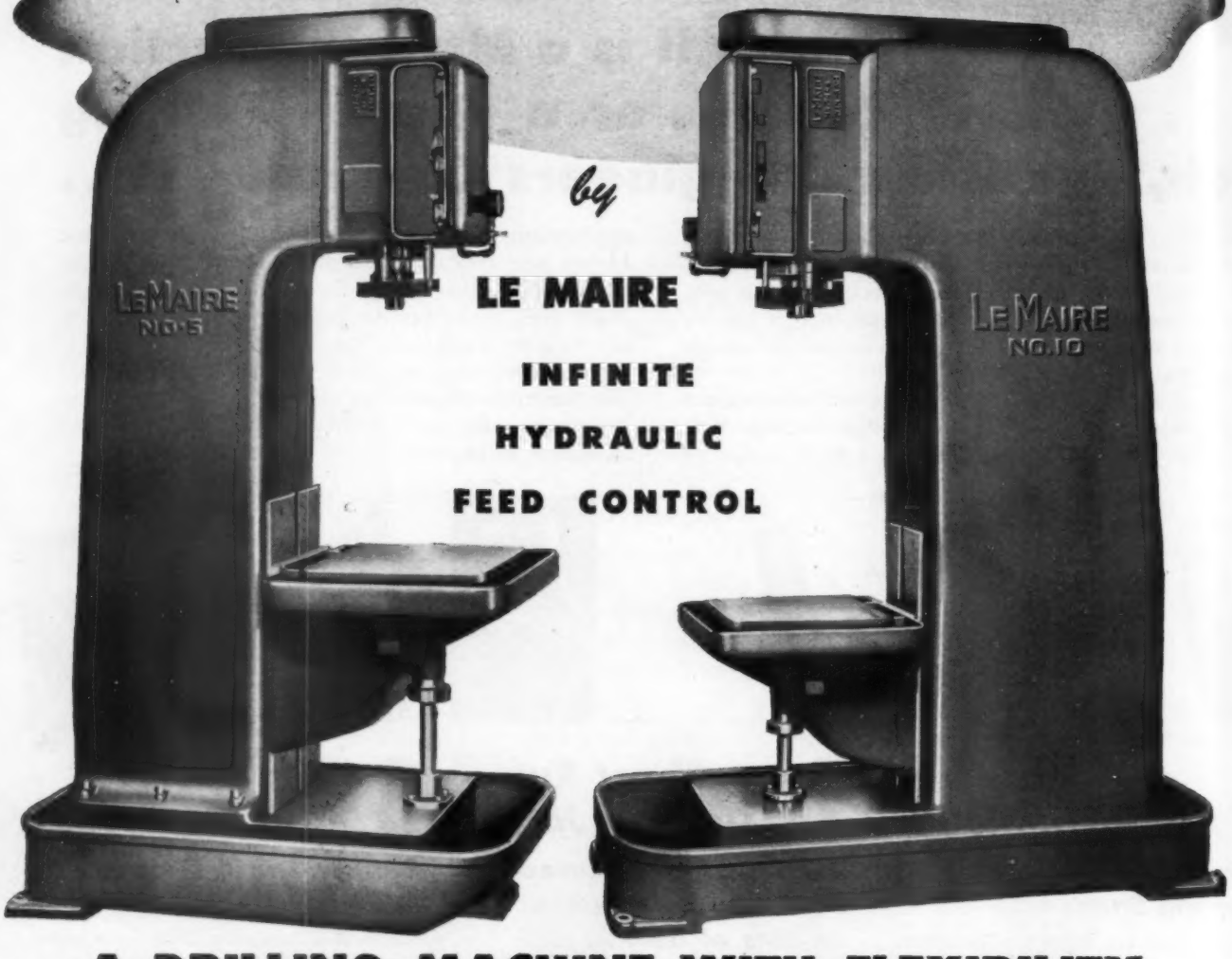
SUNDSTRAND MACHINE TOOL CO.

Rigidmils • Fluid-Screw Rigidmils • Automatic Lathes • Hydraulic Equipment • Drilling and Centering Machines • Special Milling and Turning Machines

2533 ELEVENTH ST., ROCKFORD, ILLINOIS, U. S. A.

TWO STANDARD PRODUCTION TYPE DRILLING MACHINES

for **MULTIPLE** *or* **SINGLE SPINDLE OPERATIONS**



by

LE MAIRE

INFINITE

HYDRAULIC

FEED CONTROL

A DRILLING MACHINE WITH FLEXIBILITY

Desired rapid advance and feed can be had by adjusting dogs on side of head. Hand and automatic index tables can be furnished.

In addition to the above illustrated machines a 15 H.P. slide type unit is available, giving a wide graduated range of vertical production type machines for the average requirements.

Write us today for complete information on vertical and horizontal units from 1 to 20 H.P. with strokes up to 24".

Consult us NOW regarding postwar plans on any production problems.

BUY WAR BONDS

LeMaire TOOL & MFG. CO.

2665 S. TELEGRAPH ROAD ▲ DEARBORN, MICHIGAN

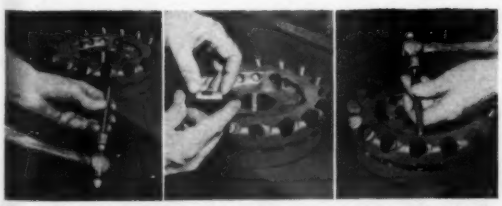
ENGINEERS AND BUILDERS OF PRODUCTION MACHINES

there lies the success

OF EVERY LOVEJOY TOOL

No inserted-tooth type tool is better than its locking device. The POSITIVE-LOCKING feature used on all Lovejoy tools has *proved* itself correct over the past 27 years. This device has many advantages—(1) Round holes do not weaken the tough, forged steel housings, (2) serrations are on the front of the blade, not on the back or locating side, (3) short blades are held as rigidly as new blades, (4) over 50% of HSS blades can be used before they must be discarded, (5) blades can be removed or replaced in a few seconds, (6) all blades are interchangeable in a single cutter, and one size of blade often covers a wide range of cutter sizes, (7) all standard blades are carried in stock for immediate shipment, (8) carbide tipped blades can be used to full advantage.

Complete information on Lovejoy tools will be sent on request.



Tap out the wedge— Move the shoe down— Tap in the wedge—Grind

IT'S AS SIMPLE AS THAT!

Positive-locking Tools

LOVEJOY TOOL COMPANY, Inc., Springfield, Vermont

MILLING CUTTERS | SINGLE POINT TOOLS | BORING HEADS | BORING BARS | SPOT FACING TOOLS | TURRET TOOL POSTS | COUNTERBORES

Keep Ahead of
DEFENSE DEMANDS
on the PRODUCTION of
EXTERNAL and INTERNAL THREADS

The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

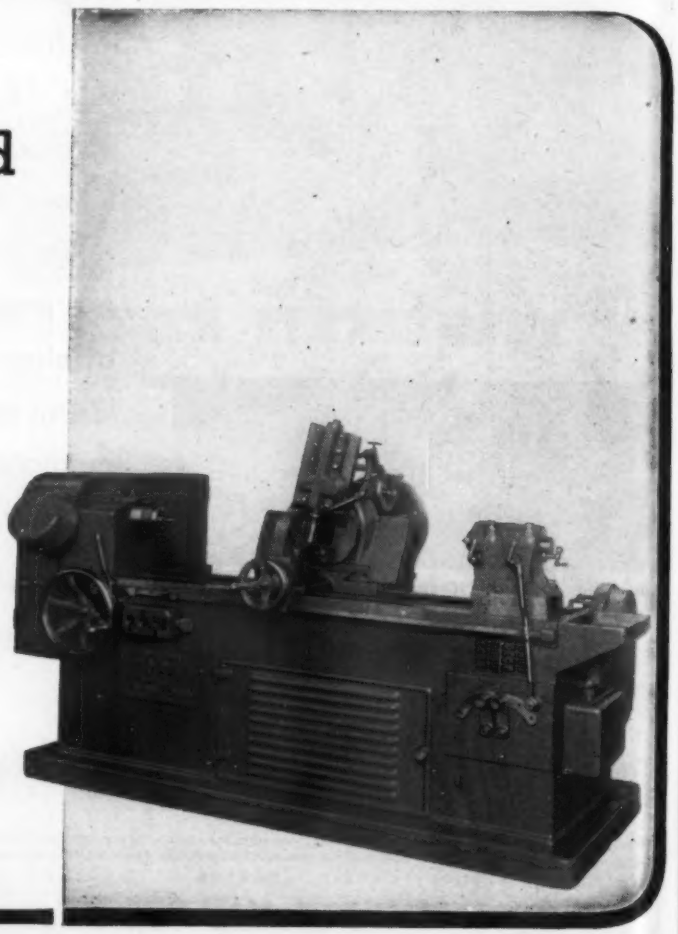
Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7"; minimum hole depends on smallest hob practical.

Send for Descriptive Bulletin giving full information.

The James **COULTER** *Machine Co.*
BRIDGEPORT · CONNECTICUT · U.S.A.

ADAMS
Gear Hobber and Thread Miller



Here is a versatile machine that will help you to produce precision gears on an uninterrupted schedule.

It excels in the production of multiple splined shafts, and it hobs spur gears and helical gears of any angle.

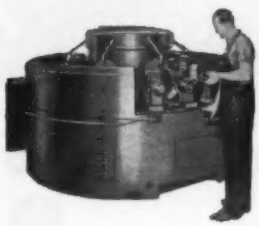
In addition, it functions as a thread miller on single or multiple threaded worms, lead and feed screws, etc.

Our catalog No. 501 contains full information. Do you want a copy?

THE ADAMS COMPANY
Est. 1883

1905 Bridge St. **Dubuque, Iowa**

call for NEW post-war production plans NOW!



SNYDER KNOWS HOW

This 8-spindle rotary turning machine was developed by Snyder to perform a single operation in multiples of eight or successive operations in multiples of four, on hubs, flanges, pistons, etc., made of steel, cast iron, aluminum and other alloys.

Each of the eight spindles is an individual turning and facing machine performing a complete operation upon an individual workpiece while the workpiece rotates and while the central turntable carries the operating assembly around the circle, from, and back to the unloading and reloading position.

Spindle and turntable speed both are changeable through pick-off gears, adapting this machine to a wide variety of applications.

SNYDER CAN GIVE YOU REAL HELP IN PLANNING MACHINES FOR ECONOMICAL PRODUCTION

● If you are planning new post-war products, you also are concerned with questions of how those products will be produced—how *quickly* they can be produced and made available to waiting markets—how *economically* they can be produced so that the largest possible market can be reached. To answer these production questions you must know what machines will best serve your production needs and you must know where and when these machines can be designed, built and delivered to you. For sound planning, you need this information *now*.

Snyder is ready to help you to project your production plans into the post-war period, ready to co-operate with you in designing machines that will automatically perform one or many operations, automatically maintain specified tolerances, automatically deliver the hourly production you will require to establish and hold your market position and to sustain a healthy payroll.

With such plans completed NOW, your machines will be ready to start through the Snyder plant as soon as restrictions are lifted on building machines for non-war production. Delivery to you can then be accomplished in the shortest possible time.

We invite you to write us in full confidence. *Snyder Tool & Engineering Company, 3400 E. Lafayette Ave., Detroit 7, Michigan.*

PLAN Your PRODUCTION
when you
PLAN Your PRODUCT

SNYDER
DESIGNERS AND BUILDERS OF SPECIAL-PURPOSE MACHINES FOR HIGH PRODUCTION AT LOW UNIT COST

20 Years of Successful Co-operation with Leading American Industries

FOR SERVICE

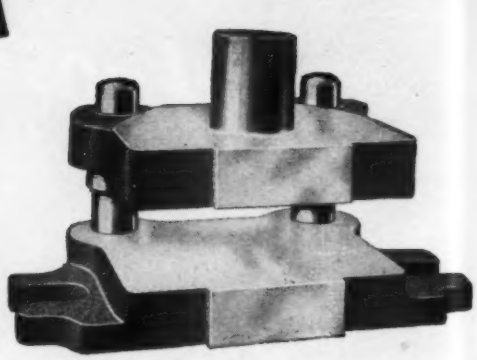
PRODUCTO DIE SETS

To speed up stampings for War Production. Producto Die Sets are available for quick assembly and shipment.

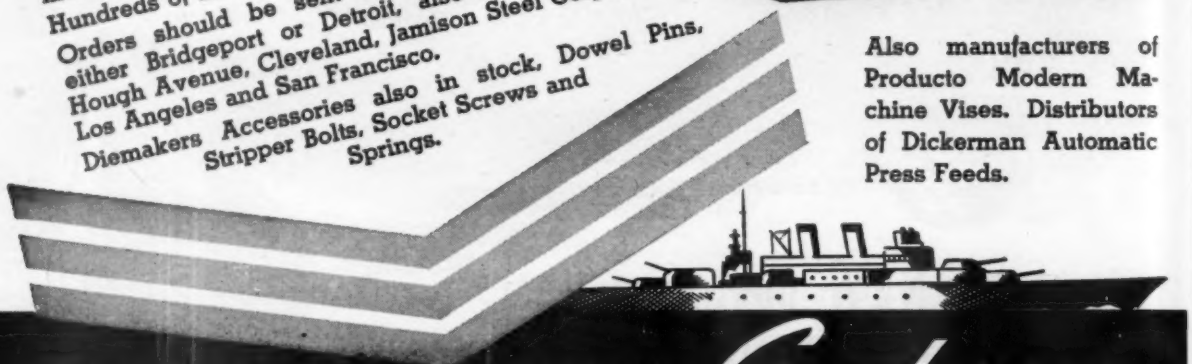
Hundreds of sizes for all types of Dies.

Orders should be sent to nearest assembly plant either Bridgeport or Detroit, also Die Supply 4747 Hough Avenue, Cleveland, Jamison Steel Corporation, Los Angeles and San Francisco.

Diemakers Accessories also in stock, Dowel Pins, Stripper Bolts, Socket Screws and Springs.



Also manufacturers of Producto Modern Machine Vises. Distributors of Dickerman Automatic Press Feeds.

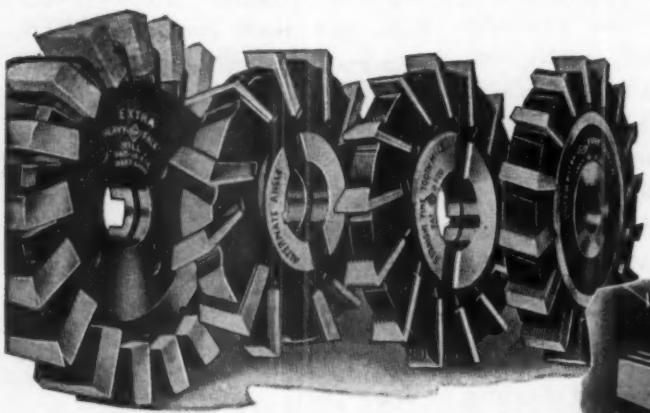


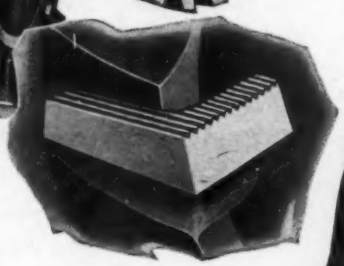
THE PRODUCTO MACHINE *Company*

940 HOUSATONIC AVE. BRIDGEPORT, CONN.

3017 MEDBURY, DETROIT, MICH.

Tools That Offer No "Conversion" Problem





The same O K SYSTEM of Metal Cutting Tools you now find such an efficient help in meeting war production schedules will fit into your post-war set-up like a hand in a glove!

Their correct design and perfect flexibility will put them to work in any metal cutting job in your peace time program. Money put into such equipment is a *long range investment!*

THE O K TOOL CO., SHELTON, CONN.

THE OK SYSTEM

OF INSERTED-BLADE METAL CUTTING TOOLS

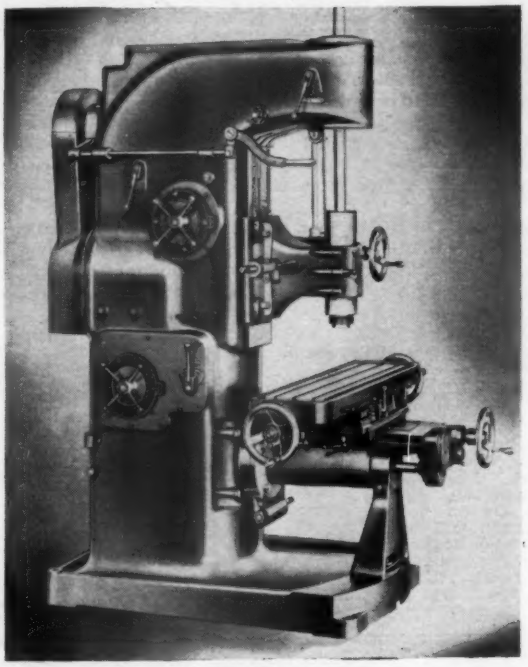
O K Tools Are Available for Every Metal Cutting Need

AN AID TO MAKING

Each Working Hour

MORE PRODUCTIVE

ALL-PURPOSE KNIGHT-Millers



● Dial indicators for quick and accurate locating, a large accurately fitted spindle to insure round and straight holes, and table slides that are square makes the KNIGHT Miller ideal for such jobs as that of handling a boring job on an eighteen inch by twenty-nine inch plate two inches thick. Nine holes, ranging from one and one-eighth inches to two inches in diameter, were accurately bored to limits of plus or minus .0005".

KNIGHT Millers' wide range of spindle speeds, solid table unit, and ease of handling provide efficient production and accurate results on many operations at one setting. An example is the work done on a large one inch steel plate. Profiling, milling, boring, slotting, and keyway cutting were among the operations performed and — ALL AT ONE SETTING.

KNIGHT Millers have the power and capacity to do the most exacting jobs — speedily and at low cost. Example: a two-inch diameter cutter, six inches long, was used to remove as much as five-sixteenths inch of stock in some places from a large forging without appreciable spindle deflection. The forging was machined completely all over and met with rigid inspection for finish and tolerance.

By using the swivel and tilting table features, the need of many special angle plates, angle cutters, and costly fixtures is eliminated. Also, by equipping the table and saddle movement with dial indicators, much preliminary layout time is saved. With the use of dial indicators, the universal table of the KNIGHT Miller serves the purpose of a universal jig and fixture built as a part of the machine.

Write for catalog.

KNIGHT VERSATILE MILLERS

IMMEDIATE DELIVERY
SUBJECT TO PRIOR ORDER

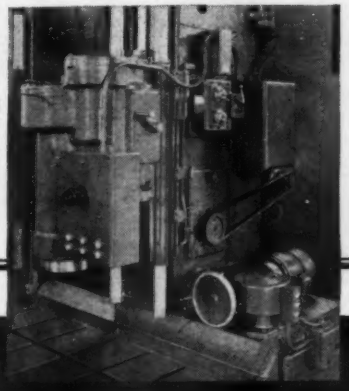
W. B. KNIGHT MACHINERY CO.
• ST. LOUIS, MISSOURI •

Bores Connecting Rods of Many Lengths

Both ends of large Diesel engine connecting rods are trepanned and bored by this special MOLINE No. HF144, two-column boring machine. Holes up to 12 inches in diameter on 20 to 60-inch centers can be handled because the right hand column is mounted on a heavy slide which is traversed by electric motor on a horizontal V-guide and flat way. The column is clamped in position on the ways or moved for close adjustment by means of handwheels. A hardened and ground plate on each spindle head permits the use of spacing rods for adjustment of centers.

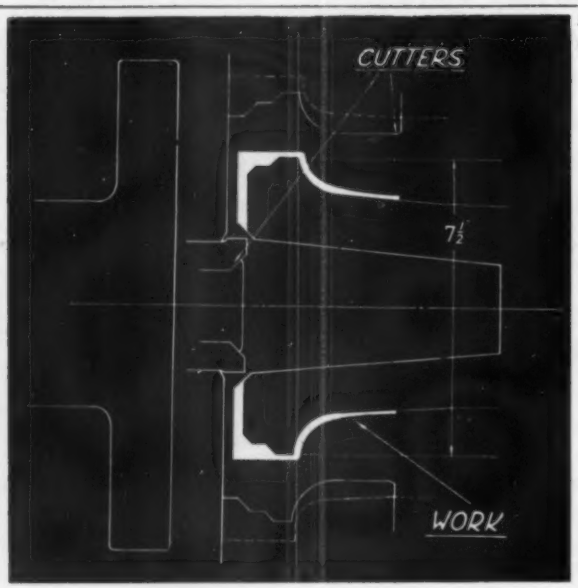
Electrically controlled, hydraulic feed moves the spindle heads on vertical, double V-guides at rates from .125 to .9 inches per minute. Any spindle speed from 5.66 to 236 R.P.M. can be obtained through quick change gears and 3 to 1 speed range spindle drive motors.

If you have a problem in drilling, boring, honing, milling, tapping or reaming, submit it to MOLINE.



Right: Close-up of spindle head showing spindle speed rheostat and push buttons for motor control.

DESIGNERS and BUILDERS of SPECIAL MACHINERY since 1901. "HOLE HOG" Drilling, Boring, Honing and Tapping Machines.



. . in 8 minutes on the PLANETARY

The machining of Propeller Shanks is completed in eight minutes each on the Planetary. This includes the simultaneous machining of all external surfaces as indicated by the heavy lines on the above drawing. Close "aircraft" accuracy is easily maintained on the Planetary well within the requirements.

THE HALL PLANETARY MILLER

Send Us Your Prints

The HALL PLANETARY COMPANY
Fox St. and Abbotsford Ave., Philadelphia, Pa.

COLLETS *with Character*

A RIVETT DRAW-IN COLLET has personality derived from a worthy inheritance and a steadily improved environment. Today when a RIVETT COLLET is shipped in its distinctive carton it reflects fifty years of experience and the most advanced methods in manufacture and inspection.

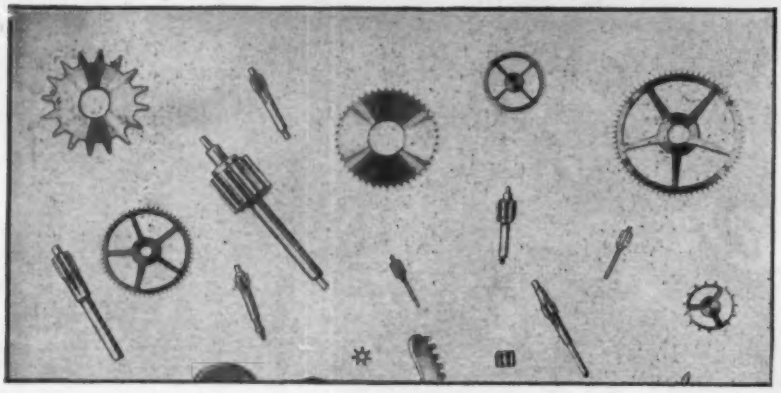
RIVETT DRAW-IN COLLETS are available in all standard styles for bench lathe, engine lathe, miller and grinder use. Work held in a RIVETT COLLET is guaranteed to run "dead true" at the collet mouth and within .002" two inches from the collet mouth. For complete information on all RIVETT COLLETS and their adaptation to existing machines write for Bulletin 100.

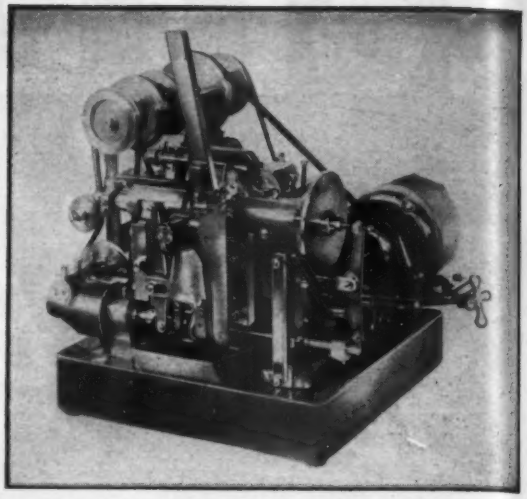
RIVETT

RIVETT LATHE & GRINDER, Inc.

BRIGHTON • BOSTON • MASS. • U. S. A.

WALTHAM PINION AND GEAR CUTTERS





Cut small, fine pitch parts in quantity to closest precision . . .

These machines—available in single-cut, multiple-cut and magazine-fed types—assure tool room standards of accuracy in cutting such parts as the typical cones shown here. These small parts—for use in watches, instruments, time fuses, etc.—can be produced easily, quickly and conveniently on Waltham machines without skilled help. Only straight teeth can be cut.

Waltham offers these machines for either countershaft or individual motor drive.

Write for complete, detailed specifications

TYPES OF MACHINES

SINGLE CUT PINION MACHINES
Only one cutter employed. Blank is positioned and machine started by hand; other movements are automatic.

MULTIPLE-CUT PINION MACHINES
Used for second or third cut; employ two or three cutters.

MAGAZINE-FED PINION MACHINES
Fully automatic (except for loading); used for continuous production of one kind of pinion.

GEAR CUTTING MACHINES
In single and multiple-cut types for cutting teeth on gears up to 1½" pitch diameter.

WALTHAM MACHINE WORKS

WALTHAM MASS.

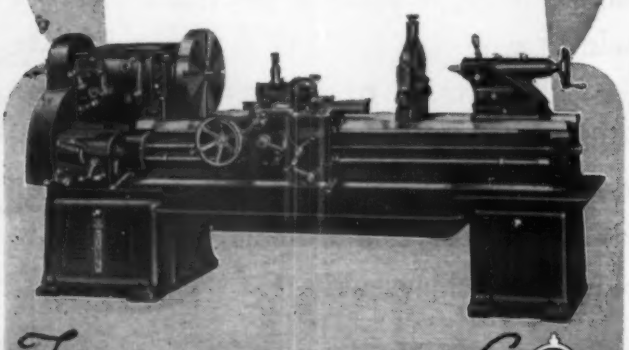
WALTHAM TRADE MARK REGISTERED U.S. PAT. OFF.

Metalmaster

12", 14" & 16" LATHES

Offer: Infinite range of threads and feeds. Easy gear adjustment. Independent motor mounting. Short, direct drive. One control for all threads. Ample power for heaviest cuts. Automatic stop for feeds.

Catalogs sent on request. Write for yours!

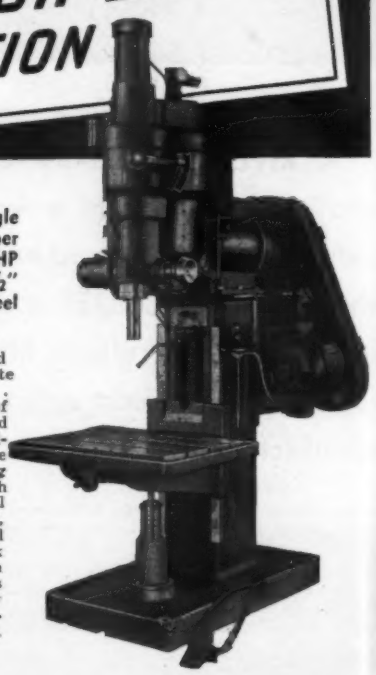


The BRADFORD MACHINE TOOL Co

MANUFACTURERS OF METAL WORKING LATHES; CAM FEED DRILLING AND TAPPING EQUIPMENT, HYDRAULIC DRILLING MACHINES . . . IN BUSINESS SINCE 1840

659 EVANS AVE. . . . CINCINNATI, OHIO

For CONTINUOUS HIGH DUTY PRODUCTION



Kaufman #10 A Hi-Duty single spindle Lead Screw Tapper made in 3 HP and 1½ HP models, with ¾" N.C. and 1½" N. C. Threads in alloy steel offers these features:

Fully enclosed . . . . lead screw and nut operate constantly in oil both . . . positively wear - proof clutches instantly engaged and controlled by air cylinder . . . quick traverse when not actually cutting threads . . . accurate depth control . . . . . control to protect tap overload, and further protected against jamming if work is placed in upside down . . . class 3 fits always assured and perfectly controllable. Complete information upon request.

L. J. KAUFMAN MFG. CO.

MANITOWOC, WISCONSIN

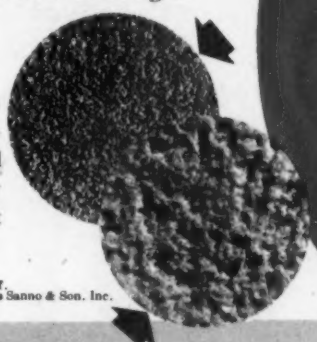
"Sure—I was from Missouri!"

"Yes, I was from Missouri until I actually saw the Por-os-way wheel taking cuts of .008 to .125", saw it breeze along a 30" edge of ¾" armor plate in 2 minutes flat. That resulted in our turning out 10,800 pieces a month for Por-os-way against 4,320 formerly." If you're from Missouri, here's the precision wheel for you! And we ask you not to be satisfied with just better-than-your-usual performance. We urge you to be brutally skeptical and critical. Try this wheel as you've never tried any others! Give it the works! Send for the Por-os-way booklet "Facts About Por-os-way"—with the "prescription blank." Order a trial lot! Then make your toughest test yourself!

CHIP CLEARANCE DOES IT!

Just as a lathe tool needs clearance so that material may be removed without interference, so the tiny points of a grinding wheel require clearance. The unusual, very porous structure of the Por-os-way wheel provides chip clearance, NATURALLY, proved by long, curling chips. Wheel dressing is greatly reduced.

THIS MAKES THE DIFFERENCE



You can spot the difference between an ordinary wheel (top) and a Por-os-way wheel (bottom) with the naked eye. The extra porosity of Por-os-way is the reason for more than 8 distinct operating advantages.

Por-os-way porosity in many cases enables you to *rough grind* with the same fine grain wheel you intend to use for precision finishing. No time wasted on wheel changes or extra finishing operations. No "special" finish wheel. Just use Por-os-way for both jobs!

The List of Por-os-way Users Reads Like a Blue Book of American Industry. Included are:

E. C. Atkins & Company • Bell Aircraft • Edward G. Budd Mfg. Co. • Buick Motor Division of General Motors • Kinner Motors, Inc. • Studebaker Corporation • Thompson Aircraft Products • Wadell Engineering Company • Westinghouse Electric • Wright Aeronautical

2 TO 5 TIMES MORE PRODUCTION PER MAN PER MACHINE

*T. M. Reg. U. S. Pat. Off.
Copyright, 1944, A. P. de Sanno & Son, Inc.

RADIAC*

POR-OS-WAY*

A. P. DE SANNO & SON, INC., 430 Wheatland Street, Phoenixville, Penna., Since 1893

NEW YORK, PITTSBURGH, CLEVELAND, DETROIT, CHICAGO, LOS ANGELES

Radiac POR-OS-WAY • Radiac PARAFLEX • Radiac Mounted Points and Mounted Wheels
Radiac Internal Grinding Wheels • Radiac Abrasive Cut-Off Machines and Discs

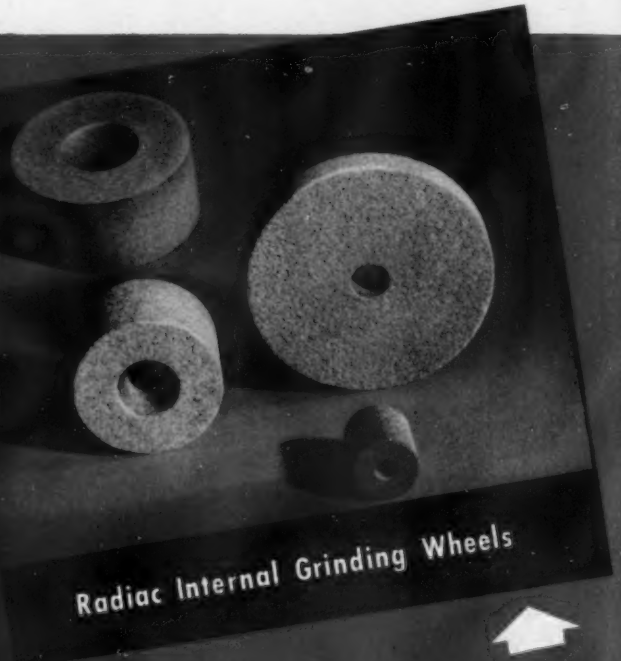
RADIAC*

MOUNTED POINTS, MOUNTED WHEELS, AND INTERNAL GRINDING WHEELS ARE: PRESCRIPTION FITTED AND CUSTOM-COMPOUNDED

Every job is a special job for Radiac! The formula for every wheel is accurately prescribed for the job. And then the "prescription" is custom-compounded, and filed so that repeat orders can be filled to exactly the same specifications. When you buy Radiac you get the right wheel—every time!

All wheels and points are dressed and finished ready to use (no finishing, by you necessary). • All kiln glaze is removed. • All are 100% tested to precision tolerances. • Concentricity is guaranteed. • Special Bakelite cement secures wheel to mandrels. • Radiac Mounted Points and Mounted Wheels are available in tough, regular aluminum oxide (brown) or in special aluminum oxide (white or red bond) for greater friability.

Radiac Mounted Points and Mounted Wheels



Radiac Internal Grinding Wheels

All wheels are 100% tested to precision tolerances. • Each is a product of pioneers in the development of internal grinding wheels. • Radiac Internal Grinding Wheels are available in tough, regular aluminum oxide (brown); in special aluminum oxide (white or red bond) or a special exclusive "Blue Glass" friable bond which permits an increase in the ratio of cutting grain to bond.

PIONEERS in the development of mounted points, mounted wheels, and internal grinding wheels.

For Fast Stock Removal, Long Life, Cool Cutting—

RADIAC*

Radiac POR-OS-WAY— Radiac PARAFLEX —Radiac Mounted Points and Mounted Wheels — Radiac Internal Grinding Wheels — Radiac Abrasive Cut-Off Machines and Discs.

A. P. DE SANNO & SON, INC., 430 Wheatland Street, Phoenixville, Penna., Since 1893

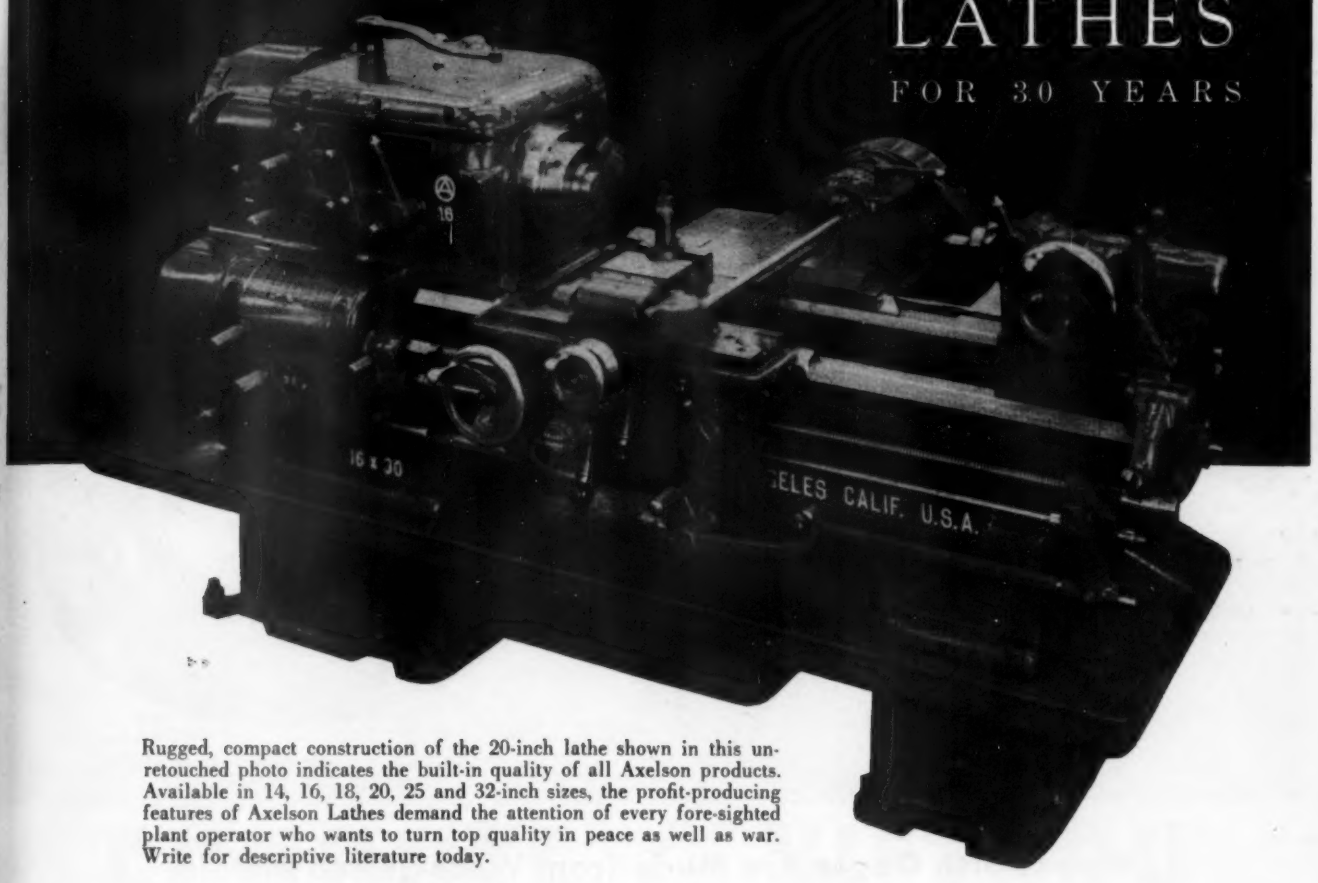
NEW YORK • PITTSBURGH • CLEVELAND • DETROIT • CHICAGO • LOS ANGELES

*T.M. Reg. U.S. Pat. Off.

AXELSON

THE OUTSTANDING NAME IN *QUALITY* LATHES

FOR 30 YEARS



Rugged, compact construction of the 20-inch lathe shown in this unretouched photo indicates the built-in quality of all Axelson products. Available in 14, 16, 18, 20, 25 and 32-inch sizes, the profit-producing features of Axelson Lathes demand the attention of every fore-sighted plant operator who wants to turn top quality in peace as well as war. Write for descriptive literature today.

Axelson Lathes have been making productive history on every Allied machine tool front where close-tolerance precision is a fighting necessity. But history making in production is an old story with Axelson Lathes — their thirty years of dependable quality and proven design have built an outstanding reputation for fast accuracy on every type of job in the turning field.

Axelson engineered features, exclusive on Axelson Lathes are fighting for Victory now. These same features, plus war-born new developments, will continue to build the Axelson reputation on thousands of post-war products after Victory.

Remember — the lathe you buy today will be turning out your peace-time products to a highly competitive market. It takes quality lathes to turn quality products — and there is no economical substitute for Axelson quality. Before you buy any lathe investigate AXELSON!

ARMY (E) NAVY

AXELSON MANUFACTURING COMPANY

6160 SO. BOYLE AVE. (Box 98, Vernon Station) LOS ANGELES 11, CALIFORNIA

50 Church St., New York • 204 Munsey Bldg., Washington, D. C. • 3844 Walsh St., St. Louis

Woodworth Gages Are Made from Wear-Tested Metals

Every piece of metal that goes into the making of Woodworth gages is tested for wear by the severest modern methods.

Every gage that leaves the Woodworth plant has a quality of ultimate finish that reveals many years of precision practice.

Every step in every operation continues to guard the Woodworth reputation by giving to American war industries accuracy they can trust.

It is these practices that have given Woodworth gages quick acceptance among the most critical users of precision measuring instruments in America.

★ ★ ★ ★

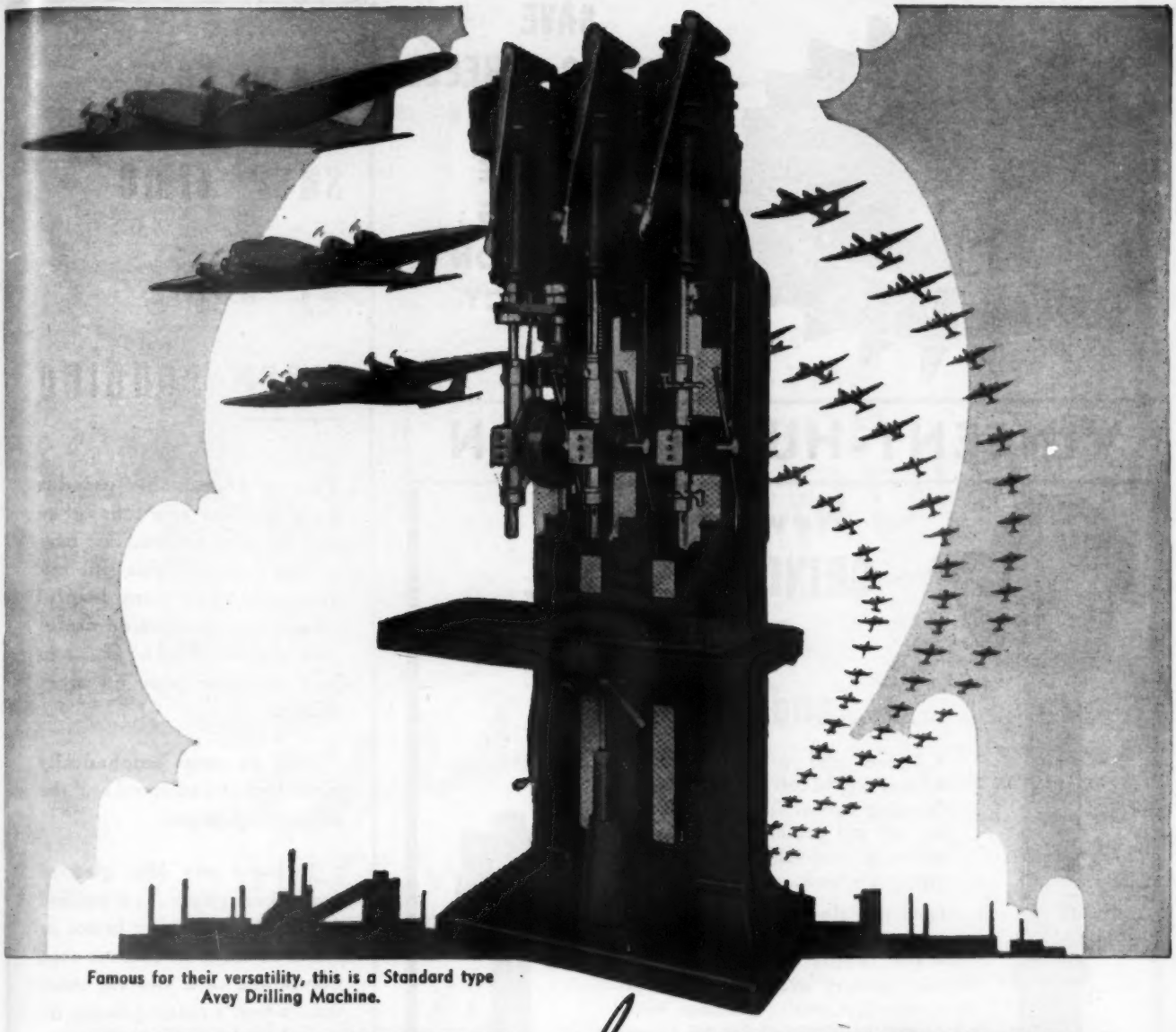
WRITE AND RESERVE YOUR COPY OF CATALOG 44G — NOW

ACCURACY YOU CAN TRUST

WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • GROUND THREAD TAPS • FORM TOOLS • PRECISION MACHINED PARTS • HEAT TREATING • PLATING



Famous for their versatility, this is a Standard type Avey Drilling Machine.

ENROUTE *to* VICTORY

. . . Right—that's where we are heading; that's why it's important to make sure we leave no stone unturned to speed that journey. Our Avey MA-6 will maintain your high production levels. Built in No. 2 (capacity in cast iron, 7/8") and No. 3 (capacity in cast iron, 1 1/4") sizes. One to six spindle units, either size. Six speed machine, two speed motor with three mechanical changes through gearing. Speed range is eight to one. Push button control. The above photograph shows the MA-6 equipped with three spindles, the Aveymatic Feed, Hand Feed, Tapper.

ARMY E NAVY

AVEY DRILLING MACHINE CO.
CINCINNATI, OHIO

Avey DRILLING MACHINES

CINCINNATI · OHIO

SAVE GRINDING WHEELS . . . INCREASE GRINDING PRODUCTION EFFICIENCY *with*

VINCENT-HUNTINGTON

HOODED TYPE DRESSER

New Improved

GRINDING WHEEL DRESSERS and CUTTERS

• Tested and proved in actual service, VINCENT - HUNTINGTON Grinding Wheel Dressers and Cutters will aid you in maintaining the accuracy and efficiency of your grinding wheels.

Note the close-up of the business end of a Huntington Grinding Wheel Dresser — the cutters. Vincent Cutters are made of *high-carbon tool steel* — precision milled — and heat-treated by the famous "Vincent Process" to assure you the hardness and toughness that is so necessary for these tools.

Do as hundreds of prime and sub-contractors have done. Meet difficult production schedules and save grinding wheels by using VINCENT-HUNTINGTON Grinding Wheel Dressers and Cutters.

Write today . . . bulletins will be sent at your request.

REGULAR TYPE DRESSER

THE
VINCENT STEEL PROCESS
Company
BELLEVUE AT VERNOR . . . DETROIT 7, MICHIGAN

"IF IT'S A HUNTINGTON DRESSER OR CUTTER — VINCENT MAKES IT."

How to save time by doing more reading

That is a profitable paradox for you. More true today than perhaps ever before. For here in the pages of this publication are packed many helpful ideas . . . considerable useful information. Much of it, in fact, available from no other source.

And we most emphatically mean *both* the editorial and the advertising pages.

Just one new idea gleaned from these pages . . . a method for doing something better or faster or easier or at lower cost, may alone save you far more than a year's reading-hours invested in this and other worthwhile business papers.

Many people have found this a fact . . . not only once, but time and time again. That's significant . . . with time so precious today.

★

Good advertising speeds information from those who have it . . . to those who need it.

■

McGraw-Hill Publishing Company, Inc.

330 West 42nd Street New York

ACCURATE UNIFORM SINGLE POINT TOOL GRINDING

THE OLIVER TEMPLATE TOOL BIT GRINDER

Machine performance can be no better than the tools that do the cutting! Keep your single point cutting tools in condition for maximum war production efficiency with the **Oliver Template Tool Bit Grinder.** Using a master template, this Oliver Grinder produces correct top rake, accurate clearances and sharp cutting edges, assuring uniform results entirely independent of the skill of the operator. Heavy, rigid and vibrationless, it can grind carbide and other high speed tools rapidly and accurately.

No single factor is more important in maintaining the efficiency of a machine than the keenness of its cutting tools. Keep them uniformly accurate and free cutting and they'll be able to handle today's high pressure war production with economy, speed and accuracy. Used extensively in the Aircraft industry on special tooling for Propeller production. Also by many Cutting tool manufacturers.

Don't Neglect Your Toolroom It's the Backbone of Production!

OLIVER INSTRUMENT CO.
1410 E. Maumee St. Adrian, Mich.

Oliver OF ADRIAN

AUTOMATIC DRILL GRINDERS — TOOL AND CUTTER GRINDERS — DRILL POINT THINNERS — TEMPLATE TOOL GRINDERS — FACE MILL GRINDERS — DIEMAKING MACHINES

SHAPING *in addition to* MILLING, DRILLING *and* BORING . . . *now available on*

Bridgeport

TURRET MILLING MACHINES

The new Bridgeport Shaping Attachment adds an extra feature which makes these machines capable of almost unlimited utility. Design is such that this new attachment can be mounted not only on existing Bridgeport Turret Milling Machines (shown here on back end of overarm) but also on other types of milling machines and special production equipment. Shaping operations can be performed at all angles making this attachment fast, and practical on die and mold work of all kinds as well as for intricate slotting on production jobs. The Bridgeport Shaping Attachment is now in production and is available promptly.

Investigate This Versatile Machine

The Bridgeport Turret Milling Machine with High Speed Milling Attachment handles milling, drilling and boring at all angles with maximum ease and convenience. It can be depended on for accuracy and speed on a wide range of work. It is sturdy and powerful—a precision machine for production demands.
Features of the machine include: 15" diameter turret with 5" overarm, rugged construction, table, knee and saddle in convenient front-of-machine position, anti-friction bearings throughout, keyed overarm with worm wheel control for angular settings, large diameter graduated dials.

Bridgeport High Speed Milling Attachments are available as separate units (¼ HP and ½ HP) for use on other types of milling machines and production equipment. They are extensively used in all branches of the metal working industry and making a valuable contribution to war production.

Write for Illustrated Bulletins giving complete detailed information on Bridgeport Turret Milling Machines and Bridgeport Shaping and High Speed Milling Attachments.

THE BRIDGEPORT MACHINES, INC., *Bridgeport, Conn.*

INVESTIGATE *Tannewitz* **DI-SAWS** *and Youll Want No Other!*

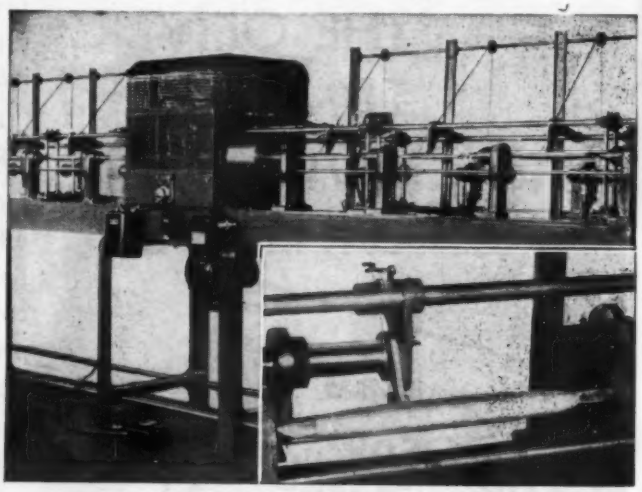
Larger wheels (24" diameter on the standard models) provide greater traction, faster, straighter cutting, more production. Transmissions, common source of die saw grief, never fail in TANNEWITZ DI-SAWS. Sturdier, heavier construction throughout, plus many refinements of design, make these machines the greatest trouble-free producers in their field. It pays to buy the best!

With a TANNEWITZ DI-SAW you can do in minutes jobs which require hours by the shaper, miller or lather methods; and there's a size to accommodate work of practically any size. Get the facts. Write for "DI-SAW Bulletin".

STANDARD MODEL No. M24 (24" WHEELS)

Other Bulletins Worth Sending For:
"SINGLE AND VARIABLE SPEED BAND SAWS FOR FOUNDRY USE", "SHEET METAL CUTTING BAND SAWS". Just a line will bring them promptly.

THE TANNEWITZ WORKS, GRAND RAPIDS, MICH.



FIDELITY QUILL WINDER . . . Taper Winding of wire for wire cloth weaving

FIDELITY Quill Winder, for accurate high speed winding of wire . . . six packages of uniformly even lay and taper at one time, speeds wire cloth weaving.

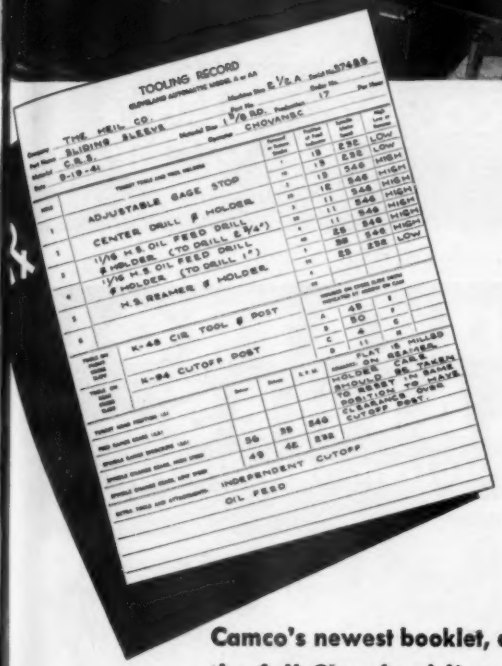
Taper is automatically governed . . . traverse is reversed and successively shortened in same operation. Slow acceleration prevents wire stretch and breakage. Hydraulic control, individual motor drive, tension control on feeder, automatic stop motion and yardage meter.

Winds from spools or brake-controlled reels.

Write for Bulletin

FIDELITY MACHINE COMPANY
3908-18 Frankford Avenue, Philadelphia 24, Pa.

Prescription for Profitable Production


TOOLING RECORD

THE NEIL CO.
BUSHING SLEEVE
C.R.S.
9-19-41

NO.	ITEM	Number of Tools	Number of Holes	Speed R.P.M.	Feed
1	ADJUSTABLE GAGE STOP	1	18	292	LOW
2	CENTER DRILL ⅜ HOLDER	1	18	292	LOW
3	11/16 H.S. OIL FEED DRILL ⅜ HOLDER (TO DRILL 5 3/4")	1	18	546	HIGH
4	11/16 H.S. OIL FEED DRILL ⅜ HOLDER (TO DRILL 1")	1	11	546	HIGH
5	H.S. REAMER ⅜ HOLDER	1	11	546	HIGH
6		1	11	546	HIGH
7		1	88	546	HIGH
8	K-48 CIR. TOOL ⅜ POST	1	25	292	LOW
9	K-94 CUTOFF POST				

	A	B	C	D
Number on Cam Sheet Controlling Movement of Tool	49	50	6	11

Tools Set Over Cam Sheet No. 1

Tools Set Over Cam Sheet No. 2

Tools Set Over Cam Sheet No. 3

	Inch	Inch	R.P.M.
Third Slide Position (A)			
Fifth Slide Position (B)	36	35	546
Sixth Slide Position (C)	49	46	292

FLAT IS MILLED BACK OF HOLDER ON C.R.S. HOLDER IS TAKEN SHOULDER TO SHOULDER TO GET CORRECT POSITION TO MAKE CLEARANCE FOR CUTOFF POST.

INDEPENDENT CUTOFF

OIL FEED

Camco's newest booklet, describing the full Cleveland line of Single Spindle Automatics, has just been released. It contains information you will find interesting, whether you are production man or president.

COSTS very often get out of control on jobs which, for one reason or another, go into production and out . . . and back again. Set-up time, even on modern machines, can run up the bill, as every production man knows.

That's just another kind of a job on which Cleveland Universal Camming can make surprising savings. In the first place, *set-up time per operation* is reduced to a remarkable minimum by the simplicity and accessability of all controlling cams. Secondly, the speed with which Clevelands *complete several operations* is such that savings over other methods *commence with the first few pieces* finished and increase in proportion to the number produced.

Because of the accurate scaling and simple adjustments of the universal cams which control all operations, the set-up man can keep an exact record of every setting. This he uses as a sort of "prescription", if the job goes back on the machine, to re-tool with a great saving over the original set-up time.

That's the sort of saving that contributes to profitable production.

Remember, Clevelands Cut Costs

THE CLEVELAND AUTOMATIC MACHINE COMPANY

CLEVELAND, OHIO

ARMY E NAVY

SALES OFFICES

CHICAGO: 1408 Civic Opera Building
DETROIT: 540 New Center Building
NEWARK: 902 American Insurance Building
CINCINNATI: 1315 American Building

IF YOU'RE LOOKING FOR **TRULY HIGH PRODUCTION**

investigate this

PORTER-McLEOD COLD METAL SAWING MACHINE

Your problem of relieving bottlenecks in cutting-off operations and keeping production moving at top speed can be solved by this 8" powerful, convenient Porter-McLeod machine.

With a capacity for cutting 8" round or 7½" square stock and arranged so that stock can be nested for multiple cuts together with a standard feed of 3" per minute, a wide variety of work can be cut on a high production basis.

Speed with safety and accuracy is assured by pulling the blade upward through cut, with blade supported close to its rim to eliminate the possibility of buckling and weaving. A friction disc feed insures against blade damage and breakage. Blade design is such that every tooth cuts.

Get all facts today concerning this fast, accurate, straight-cutting machine. Write for Illustrated, Descriptive Bulletin.

PORTER-McLEOD MACHINE TOOL CO., INC.
HATFIELD, MASS., U. S. A.

ROTOREX UNIVERSAL GRINDER

Cylindrical grinding Attachment

Internal grinding Attachment

Sharpening a Helical Cutter

FOR SHARPENING and PRODUCTION

PRECISION BUILT to perform two jobs—Production work such as cylindrical and internal grinding and sharpening of all kinds of tools.

The keynote of the Rotorex is simplicity, accuracy and flexibility.

Compact and simple in design with a minimum number of working parts in conjunction with conveniently located controls.

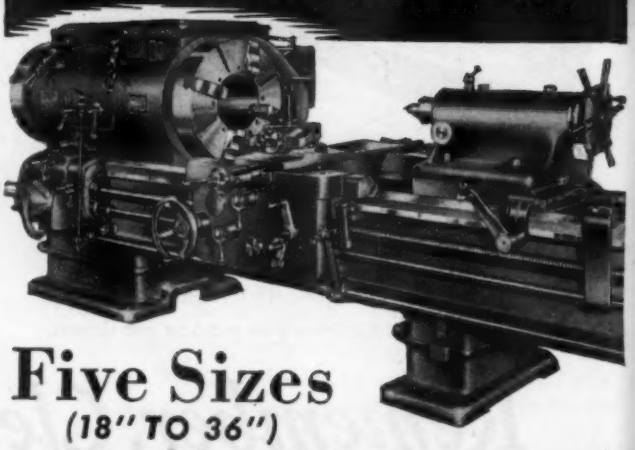
Precision built for sustained accuracy because of good workmanship.

The variety of work it handles is attained by a wide range of attachments for faster set-ups Selective speed range from 3000 to 6000 RPM

DOUGLAS MACHINERY CO., Inc.
144 BROADWAY, NEW YORK, N. Y.

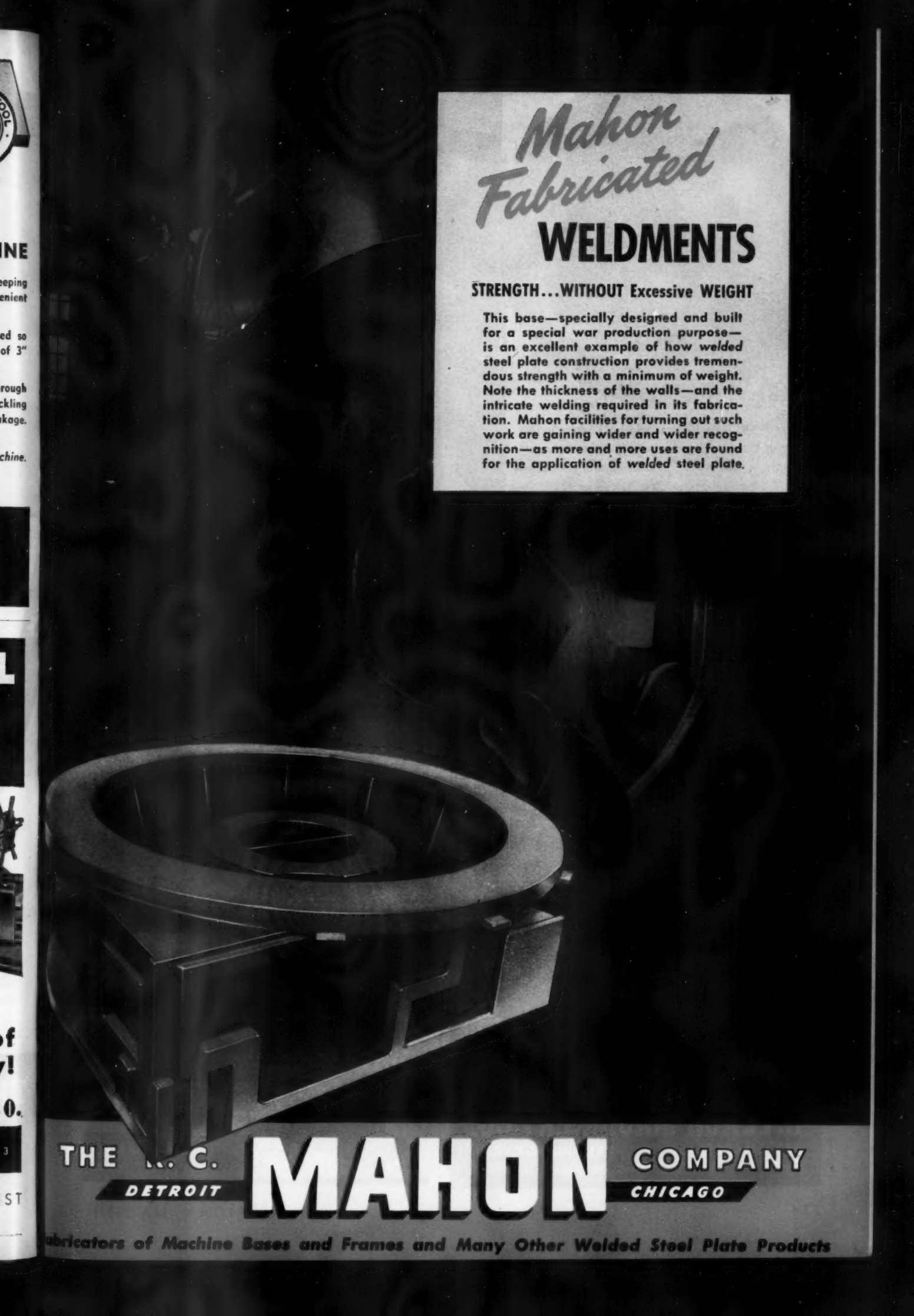
HYDRATROL LATHES

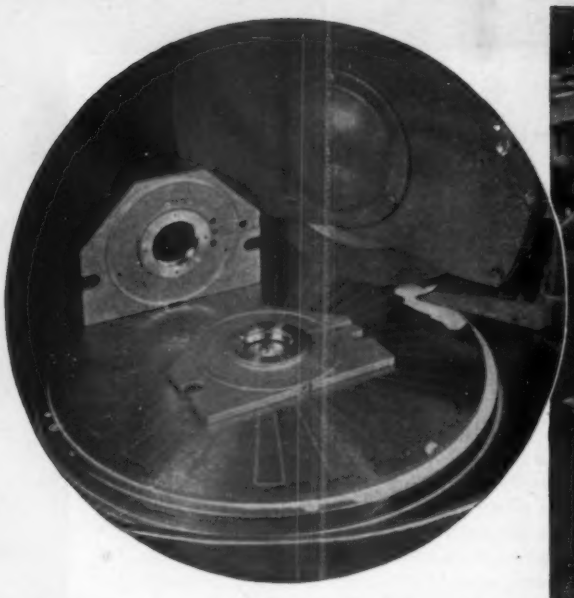
Large Hollow Spindle Type



Five Sizes
(18" TO 36")
Provide Wide Range of Usefulness and Efficiency!

Lehmann MACHINE CO.
CHOUTEAU AT GRAND ★ ST. LOUIS 3


Mahon Fabricated
WELDMENTS
STRENGTH...WITHOUT Excessive WEIGHT
This base—specially designed and built for a special war production purpose—is an excellent example of how *welded* steel plate construction provides tremendous strength with a minimum of weight. Note the thickness of the walls—and the intricate welding required in its fabrication. Mahon facilities for turning out such work are gaining wider and wider recognition—as more and more uses are found for the application of *welded* steel plate.
THE ... C. MAHON COMPANY
DETROIT
CHICAGO
Fabricators of Machine Bases and Frames and Many Other Welded Steel Plate Products



For general tool room grinding. Model A-3 Rotary Surface Grinder at Vinco Corporation, Detroit. Simple to operate . . . produces good finish . . . holds work to close tolerances. Production increase—50 to 100 per cent.

ARTER GRINDING MACHINE COMPANY

ARMY E NAVY

WORCESTER, MASSACHUSETTS • U. S. A.

LM LM

LEACH External Grinder

Price reduction made possible by increased production.

PRICE

~~$985.00~~

$875.00

Fully Equipped

Our dealers will help you fill out necessity priority forms.

Write us today for your nearest dealer's name and address.

Grinds Work from ¾" to 11" in length and from ⅛" to 7" in diameter.

Send for Descriptive Literature

EXCELLENT DELIVERIES

Exclusive Selling Agents

H. LEACH MACHINERY CO.

387 CHARLES ST. PROVIDENCE, R. I.

Agents in all Principal Cities Throughout the World

LELAND-GIFFORD COMPANY · WORCESTER MASS. U.S.A. · MACHINE TOOLS · CRANK SHAFTS

Drilling and Tapping Machines

(Automatic and Semi-Automatic)

LELAND GIFFORD CO.

WORCESTER, MASS.

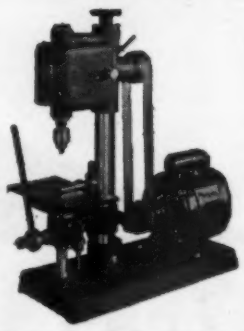
SMITH & MILLS

CRANK SHAPERS

sizes 12" to 32" stroke

THE SMITH & MILLS CO. Cincinnati, Ohio

HAMILTON-MUEHLMATT



. . . for Speeds Sensitive Tapping

A high production sturdy little machine particularly suited to precision tapping of light work such as instruments, cameras, watches, clocks and business machines. Sensitivity of operation, and high spindle speeds account for accurate work without breakage of fine taps. Can be attached to any light socket. Write for complete information.

The Hamilton Tool Co.

HAMILTON OHIO

Announcing

THE CHANGE IN OUR CORPORATE NAME

from

THE LINCOLN PARK TOOL and GAGE COMPANY

to

LINCOLN PARK INDUSTRIES
INCORPORATED

The Management, Personnel and Policies of the Lincoln Park organization remain unchanged

THE MERGER OF

CARBUR, INC.

Manufacturers of Solid Cemented-Carbide Rotary Files and Cutting Tools

with

LINCOLN PARK INDUSTRIES, INC.

The name "Carbur" will continue to identify the tools formerly manufactured by Carbur, Inc. However, future production will be handled as a departmental operation of Lincoln Park Industries, Inc.

☆ A star has been added to our Army-Navy "E" flag. In making this award, Robert P. Patterson, Under Secretary of War, writes, "You have continued to maintain the high standards that you set for yourselves and which won you distinction more than six months ago."

ARMY E NAVY

LINCOLN PARK INDUSTRIES, INC.

Successor to LINCOLN PARK TOOL AND GAGE COMPANY
LINCOLN PARK 25, MICHIGAN

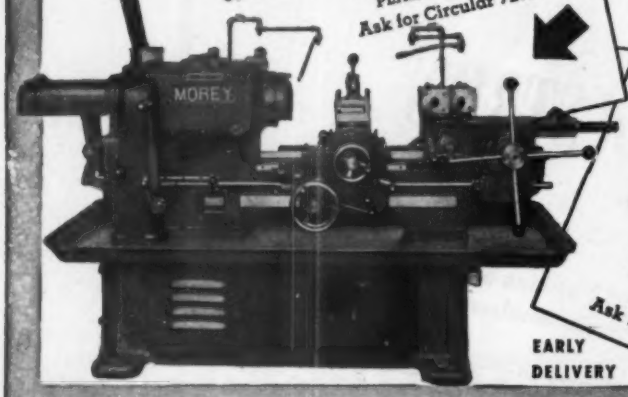
MOREY TURRET LATHES
for BAR or CHUCKING { UNIVERSAL or PLAIN

3 UNIVERSAL
For bar stock up to 1½" in diameter
10" turning length
16½" swing over bed
Infinite spindle speeds: 55 to 1800 RPM, constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 727A

2 PLAIN-GEARED
For bar stock up to 1" in diameter
Turning length 6½"
Swing over cross slide 6"
Swing over bed 14"
Infinite spindle speeds:
Minimum of 60 RPM.
Maximum of 2000 RPM.
Constant horsepower at all speeds.
Ask for Circular 629A

4 UNIVERSAL
For bar stock up to 2" in diameter
12" turning length
18½" swing over bed
Infinite spindle speeds: 35 to 1500 RPM, constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 736A

EARLY DELIVERY



- INFINITE SPINDLE SPEEDS —Electrically Selected—
- DIRECT BELT DRIVE AVAILABLE AT HIGH SPEEDS ELIMINATES GEAR MARKS (patents applied for).
- GEARED SPINDLE SPEEDS INSTANTLY AVAILABLE THROUGH MULTIPLE DISC CLUTCHES.
- SPINDLE MOUNTED ON TIMKEN BEARINGS.
- RIGID—WITH SUFFICIENT POWER TO TURN AT THE HIGHEST SPEEDS AND FEEDS MODERN TOOLS WILL WITHSTAND.
- SPINDLE SPEEDS AND POWER FEED CHANGES WITHIN EASY REACH OF OPERATOR.

ARMY NAVY

- THE DESIGN OF THE MOREY No. 2, 3 and 4 TURRET LATHES ARE BASICALLY ALIKE. EACH MACHINE IS ENGINEERED FOR THE SIZE WORK IT IS DESIGNED TO HANDLE.

DESIGNED AND BUILT BY
MOREY MACHINERY CO., INC
410 BROOME STREET, NEW YORK 13, N. Y.
PLANT: 4-57 26TH AVE., ASTORIA 2, NEW YORK

• On this one machine you can lap and polish—quickly, precisely—a wide variety of small metal and plastics parts, each at its most efficient finishing speed! • Schauer Ideal Variable Speed Lathes provide a wide range of spindle speeds—in a ratio of 11 to 1 with a two-speed motor, or 6 to 1 with a single-speed. Write for Catalog 440, showing and describing various models and sizes.

SCHAUER MACHINE COMPANY
ORIGINATORS OF TODAY'S SPEED LATHES
2067 READING ROAD ··· CINCINNATI 2, OHIO

MILLHOLLAND

Automatic DRILLING - BORING MILLING - TAPPING Units

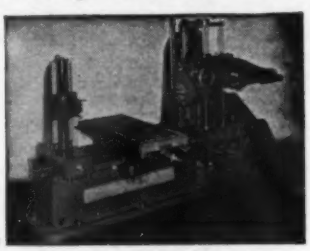
½ to 20 HORSEPOWER DRIVE

AUTOMATIC and SEMI-AUTOMATIC PRODUCTION MACHINERY

W. K. MILLHOLLAND MACHINERY CO.
Indianapolis, Ind.

UNIVERSAL *Horizontal Boring Machine*
The only TRIWAY *Boring Machine Built*

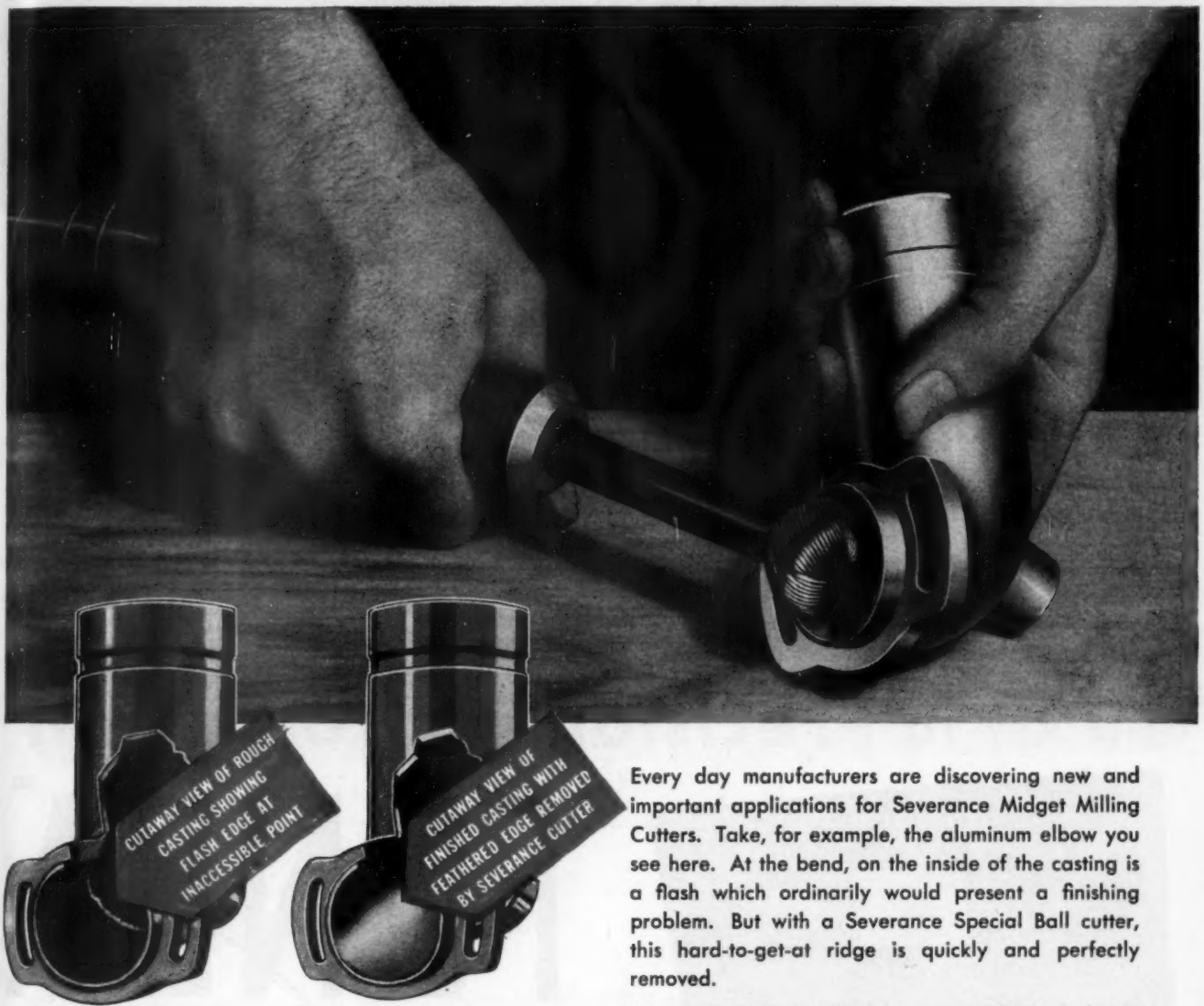
Made in 3" and 4" spindle sizes. Write for complete, detailed specifications.



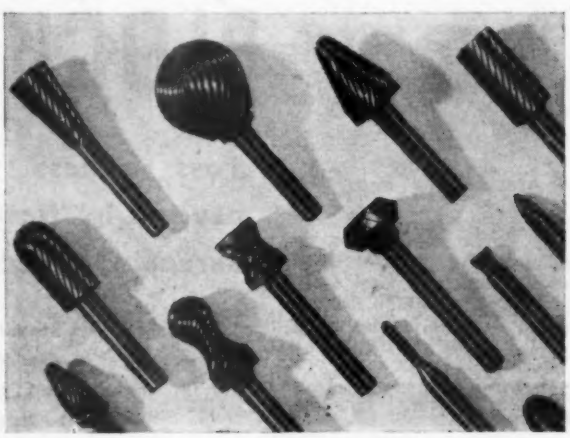
Standard Universal 3" Spindle Machine

UNIVERSAL BORING MACHINE CO.
Hudson, Mass., U. S. A.

SEVERANCE MIDGET MILLING CUTTER GIVES PERFECT FINISH INSIDE INTRICATE CASTING


CUTAWAY VIEW OF ROUGH CASTING SHOWING FLASH EDGE AT INACCESSIBLE POINT
CUTAWAY VIEW OF FINISHED CASTING WITH FEATHERED EDGE REMOVED BY SEVERANCE CUTTER

No matter what your finishing requirements may be, there is a Severance Midget milling cutter made to fit your needs.
Severance regrinding service saves you time and money. Severance complete line of "Carbide" midget milling cutters are now available.



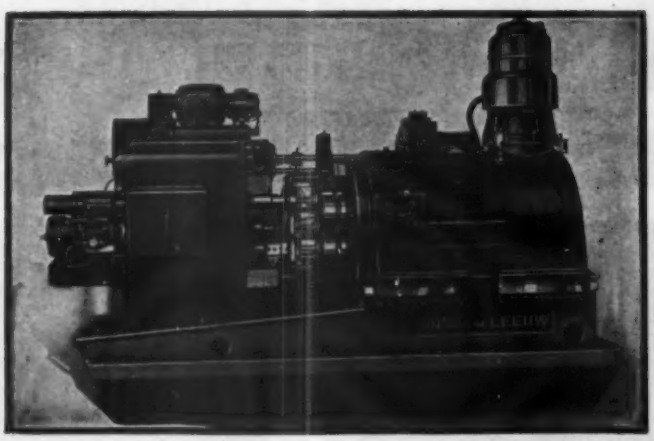
Every day manufacturers are discovering new and important applications for Severance Midget Milling Cutters. Take, for example, the aluminum elbow you see here. At the bend, on the inside of the casting is a flash which ordinarily would present a finishing problem. But with a Severance Special Ball cutter, this hard-to-get-at ridge is quickly and perfectly removed.

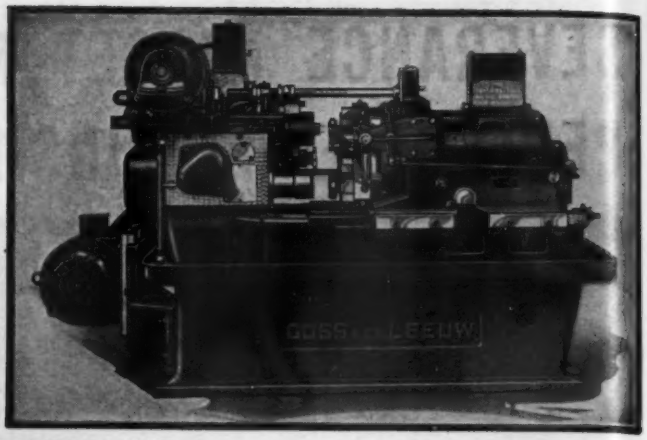
Severance Midget Milling Cutters are efficiently finishing castings, parts and patterns made of metals, alloys, plastics and wood. With portable power tool, with stationary set-up or by hand, Severance Cutters do the finishing job cleaner, faster and easier.

If you wish to speed up your finishing of manufactured parts send us samples. Our engineers will help you determine the kind of cutter best fitted to your needs.

Severance

MIDGET MILLING CUTTERS • PRECISION REGRINDING
SEVERANCE TOOL INDUSTRIES INC., SAGINAW, MICH. • PLANTS IN LONG ISLAND CITY, N.Y.; DETROIT, MICH.; FORT WAYNE, IND.; CHICAGO; AND LOS ANGELES





WORK ROTATING TYPE

5 Spindles
6 Spindles
8 Spindles

GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES

TOOL ROTATING TYPE

4 Spindles
5 Chucking Positions

On these machines, two threading operations can be handled simultaneously, each thread controlled by its own lead screw.

Among the many other modern features offered in both types are: pre-loaded anti-friction spindle bearings, hardened ways, oversize spindles and gears of chrome-nickel steel, heat-treated.

Complete details will be found in descriptive catalog available on request.

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

"THE KEY TO *Precision in Production*"

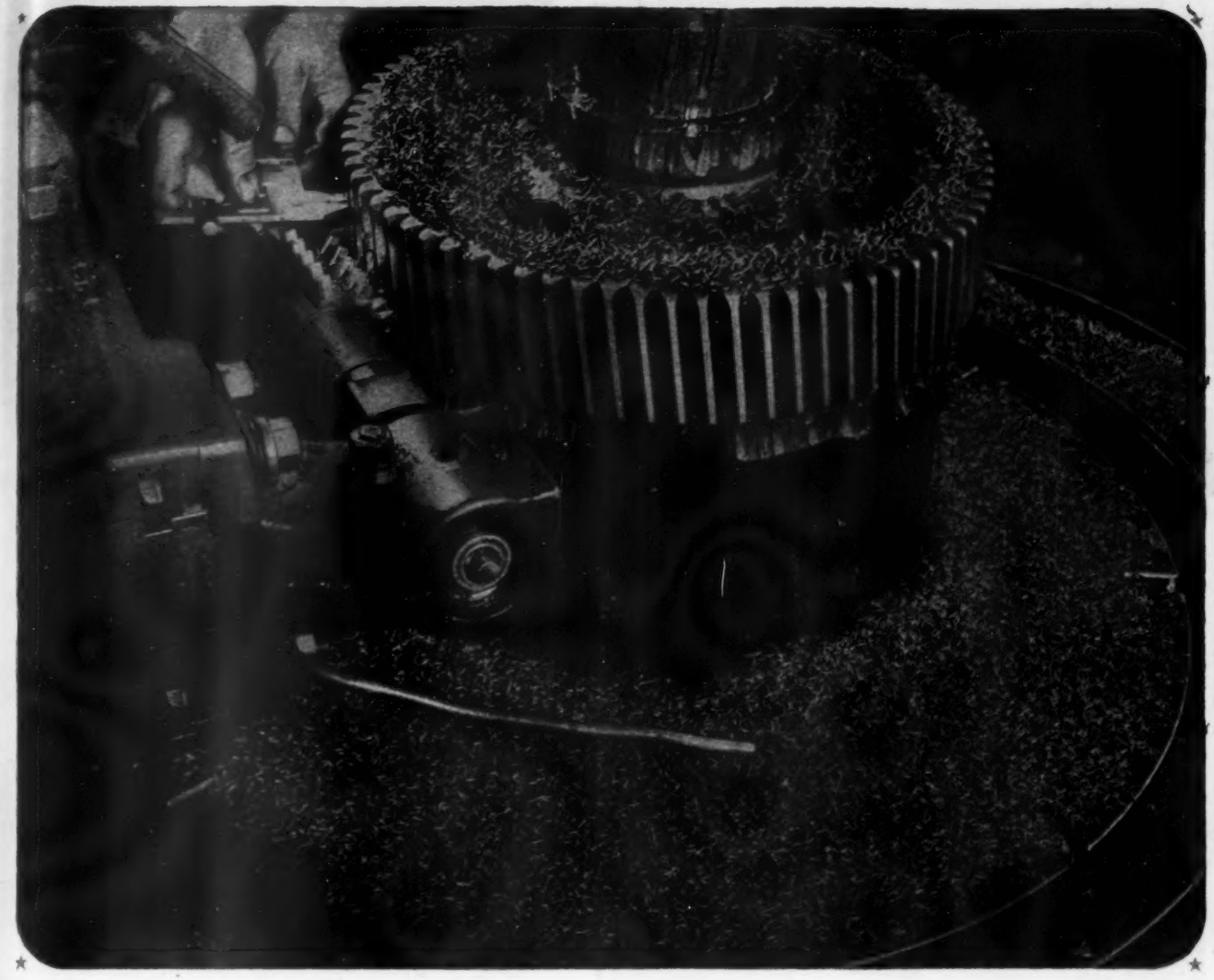
FONDA *Gage* BLOCKS

A new technique is applied to FONDA GAGE BLOCK manufacture throughout all operations — from the selection of raw stock, through grinding, heat treating, stabilizing, finish grinding, the final precision machine lapping — Long lived precision is literally built in. The "ULTRA FINISHING" process, developed by Fonda engineers, is the greatest factor in prolonging FONDA GAGE BLOCK life. Available through your local dealer in three degrees of accuracy of .000002", .000004" and .000008". Write to Dept. H for descriptive literature.

Pass highest tests devised by National Bureau of Standards

Fonda Gage Blocks are offered in American Standard sizes of 82, 35 and 10-piece sets. Metric size sets of 103 and 38 blocks are available.

FONDA GAGE CO., 175 Fifth Ave., New York 10, N.Y. - Factory: Stamford, Conn.



KEEP 'EM CUTTING . . AND SAVE THE PIECES

IN this war, machine tools on the average are cutting away steel at a rate more than 12 times faster than in 1918. That's production—keep them cutting!

Keep them cutting *faster* by selecting tool steels more closely suited to the job. Case after case in our files show increases in feeds, speeds, or pieces per grind—increases, often, of 50% and more—when the *right* tool steel went to work.

Keep them cutting *constantly* by knowing the best alternate tool steel for each job. Know it, and know its performance, as insurance against a time when your first-choice steel may be short in supply.

And save the pieces! Every particle of steel, especially High Speed Steel, is important, and much critical alloy material can be saved for re-use if proper methods of reclamation and classification are employed.

Let us help with your problems of selection, treatment, use and salvage.

ADDRESS DEPT. AM-21

Allegheny Ludlum
STEEL CORPORATION
BRACKENRIDGE, PENNSYLVANIA

A-8844 . . . W & D

PORTAGE

NO. 4

HORIZONTAL BORING DRILLING & MILLING MACHINE

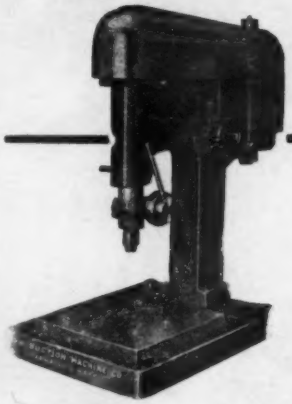
• Designed and built to meet the need for speed and accuracy demanded of today's production.

WRITE TODAY

for fully illustrated bulletin giving detailed description of the many features of this Horizontal Boring, Drilling and Milling Machine. No obligation.

THE PORTAGE MACHINE CO.
AKRON 11, OHIO

REED TYPE 25 Sensitive Bench Drill



an all purpose machine for precision work

SPECIFICATIONS

Capacity ¼"
Spindle Travel—3"
Head Adjustment—3"
Table Surface—11" x 11"
Belt and Chuck furnished
Motor ½ HP ball bearing

•

Write for full description and specifications

Infinite spindle speeds—from 1500 to 10,000 R.P.M.—controlled by convenient hand wheel and shown by speed indicator, make this a highly versatile machine for a wide variety of light, precision work.

Moving parts are totally enclosed, the drill chuck being the only part exposed. This feature together with stream lining contribute to its absolute safety even in the hands of women operators. Rugged strength is provided by using only two castings for base and column. Utmost precision is achieved by full mounting of spindle on finest quality ball bearings.

The Reed Type 25, is made in from 1 to 4 (inclusive) spindle models. Individual speed control and motor drive are provided for each spindle.

PRODUCTION MACHINE CO.
Manufacturers of Drilling Machines, Tool Grinders and Hand and Automatic Polishing and Grinding Machines.
GREENFIELD, MASS., U. S. A.

GILBERT

THE CINCINNATI GILBERT MACHINE TOOL CO.
CINCINNATI, OHIO

LUCAS "PRECISION"

Horizontal Boring, Drilling and Milling Machine
THE LUCAS MACHINE TOOL CO.

NOW AND ALWAYS OF

CLEVELAND
OHIO, U. S. A.

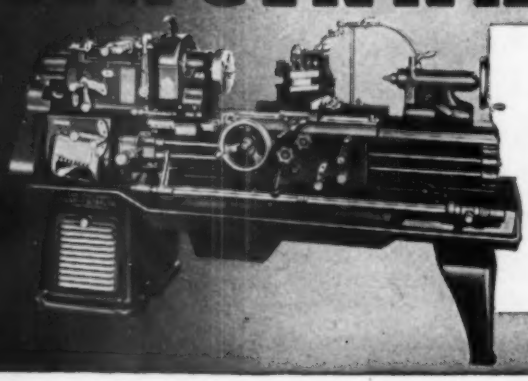
DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

CINCINNATI LATHES

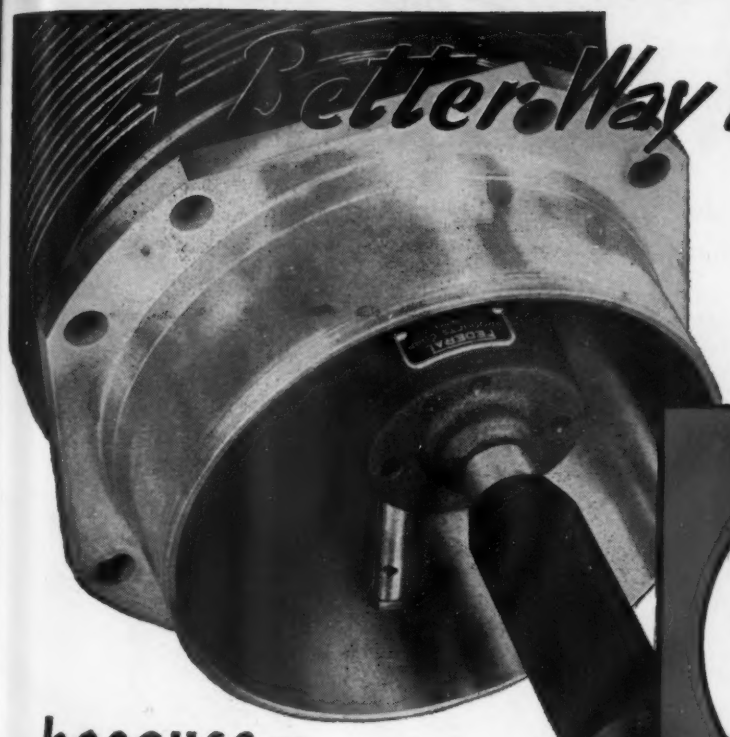


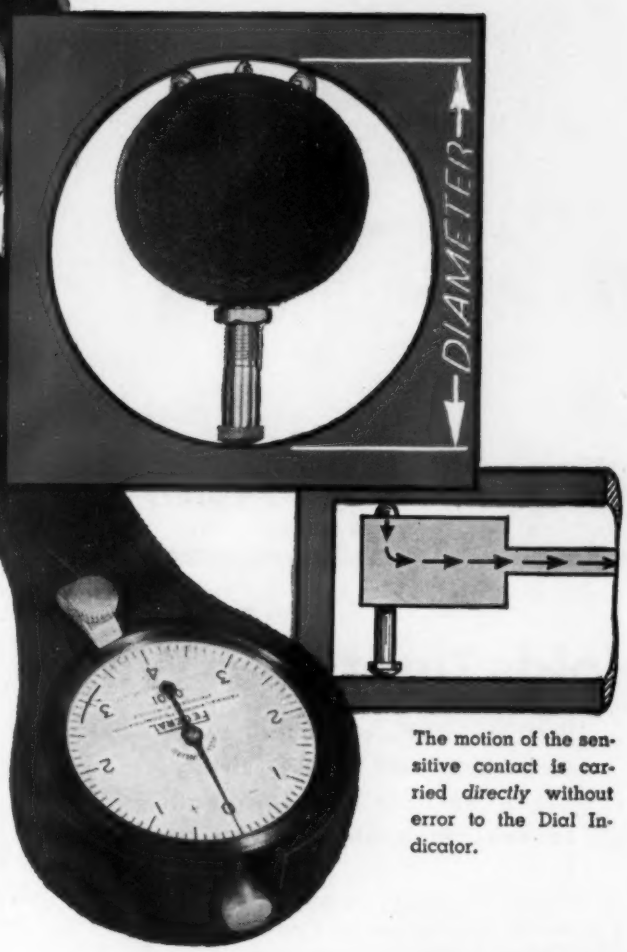
Assure High Production to Exacting Standards

Ruggedness, accuracy, versatility and speed are combined in Cincinnati Lathes in exactly the right proportion to meet the rigid demands of war production. If you will outline the aircraft, munitions or other similar jobs which require improvement in handling, our engineers will gladly offer suggestions for tooling which will assure the utmost in accuracy and output. Send for catalog giving details of Cincinnati Lathes — in sizes from 14" to 30".

THE CINCINNATI LATHE & TOOL CO.
Rogers Road, Oakley SPECIALISTS SINCE 1906 Cincinnati, Ohio

A Better Way to Inspect — HOLE DIAMETER





The motion of the sensitive contact is carried *directly* without error to the Dial Indicator.

because —

of a better way to transfer motion around a corner.

With this Gage you can "explore" a hole for roundness, taper, hollow and high spots, as well as accuracy of diameter, faster and with greater sureness.

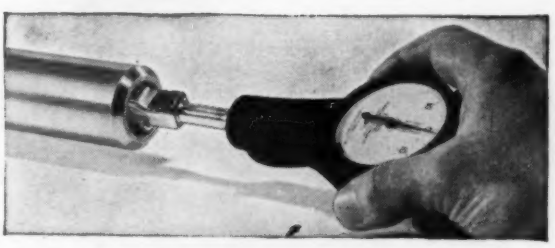
Its accuracy and positiveness are exeptional because of its unusual method of carrying the dimensional variations to the Dial Indicator. The motion is carried direct *without* internal friction or lost motion to the Indicator.

It has none of the limitations of conventional plug gages. Customers who have used various kinds of hole gages report a decided preference for this gage. Tell your requirements to —

FEDERAL PRODUCTS CORPORATION
1144 EDDY ST., PROVIDENCE 1, R. I.

CHICAGO • CLEVELAND • DETROIT • DALLAS • HARTFORD • HOUSTON • INDIANAPOLIS • LOS ANGELES MEMPHIS • MILWAUKEE • MINNEAPOLIS • MONTREAL NEW YORK • PHILADELPHIA • PITTSBURGH ROCHESTER • SAN FRANCISCO • ST. LOUIS • TORONTO WINDSOR

Special adaptations are always possible.



Holes from ½" up in diameter and of various lengths can be gaged. You don't guess, you see the actual variations.

★ FEDERAL ★ ★

PRECISION MEASURING INSTRUMENTS

LIBERTY Proves ONE Equals TWO

When You Use Liberty High Speed Grinding Attachments

Here is a machine tool which will DOUBLE the potential capacity of your surface grinders.

Model No. 90-31
Set at 90°, grinding a gage seat in a hard-to-get-at place. Can be set to any angle within 180°.

LIBERTY HIGH SPEED GRINDING ATTACHMENTS are precision built for intricate and hard-to-get-at precision grinding jobs.

Model No. 90-31
Sharpening broach with 5° clearance.

Model No. 90-31
Grinding hardened flats and blind slots in restricted working space.

Model No. 90-31
Grinding hardened work seat ordinarily hard to get at.

WRITE FOR FURTHER INFORMATION

LIBERTY TOOL & GAGE WORKS, INC.
241 GEORGIA AVE. PROVIDENCE 5, R. I.

Holds Tight as a Weld!

WEDGE-LOCK, exclusive with ARMOR COLLET CHUCK, firmly grips hardest steel though several thousandths outsize

Contour wedges lock positively, open instantly. Effortless operation. Accurate stock length assured. Chuck turns with spindle; no internal ball-bearings or gears. Runs cool...no friction, no drag on motor, no lubrication. Full spindle capacity for lathes with 1½"-8 thread spindles. Larger sizes on special order. Delivery *now*. Address Dept. MT2.

Collets changed in 2 minutes
All parts specially ground, hardened

AIRCRAFT MACHINERY CORP.
214 West Orange Grove · Burbank, California

HOLMAN

BETTER, FASTER HOLE FINISHING

HELICAL TAPER PIN REAMERS

Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

HOLMAN REAMER CO.
MANCHESTER, CONN.

Giant KEYSEATERS

For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

MITTS & MERRILL
913 Tilden St.
Saginaw, Michigan

The RANDALL & STICKNEY Platform Gauge

. . . . *takes work up to 7 inches*

Work of similar size can be quickly and easily inspected by setting gauge head at desired height with standard block or plug. Spindle on gauge head travels ½".

Dial graduated 0 to 50 in. thousandths; second-hand records 10ths of inches. Can be furnished to read to .01 mm.

Base 8" square; height 13"; weight 18½ lbs.

Investigate Now!!

RANDALL & STICKNEY
Waltham, Mass.

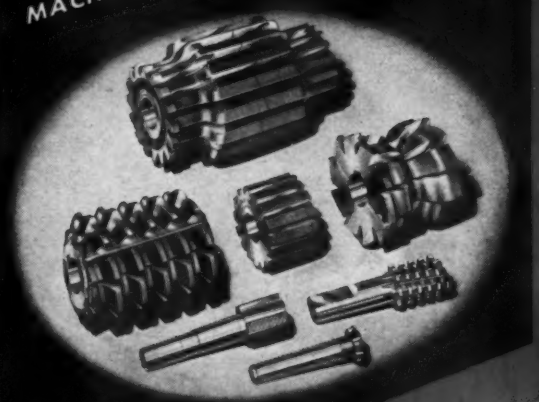
MILLING CUTTERS • BROACHES • FORM TOOLS • END MILLS • HOBS

GEAR CUTTERS • UNGROUND GEAR AND SPLINE HOBS • GROUND AND UNGROUND MULTIPLE THREAD MILLING CUTTERS

COUNTER BORES • REAMERS • STANDARD END MILLS AND MILLING CUTTERS FROM STOCK • SPECIAL CARBIDE TIPPED TOOLS

HUDSON
D. O. JAMES MANUFACTURING CO.
CROSLEY
CURTISS-WRIGHT
AMERICAN CAN CO
CRUCIBLE STEEL
RCA
PRATT & WHITNEY AIRCRAFT
ALFA ROMEO
HURLEY MACHINE
INTERNATIONAL HARVESTER
MINNEAPOLIS-MOLINE POWER IMPLEMENT
CATERPILLAR TRACTOR
ALLIS-CHALMERS
WESTINGHOUSE
TIMKEN
CHEVROLET
CHRYSLER
SAVAGE ARMS
STUDEBAKER
REMINGTON RAND
OTIS ELEVATOR
Bendix
McQuay-Norris
REPUBLIC Aviation
Massey-Harris
WARNER & SWASEY
OHIO SEAMLESS TUBE
GLOBE TUBES
Allison
BRIDGEPORT BRASS
TELETYPE
OLDSMOBILE
DEERE & COMPANY
Ford
JACK & HEINTZ
UNDERWOOD ELLIOTT FISHER
NASH MOTORS
CRANE
KEARNEY & TRECKER
AIR ASSOCIATES
BUICK
MUNCIE GEAR
A. O. SMITH
WILLYS-OVERLAND MOTORS
BORG-WARNER
Thor

IT IS SIGNIFICANT THAT THE VITAL PARTS OF SO MANY WORLD FAMOUS QUALITY PRODUCTS ARE MACHINED WITH LAKE SHORE TOOLS



MILLING CUTTERS • BROACHES • FORM TOOLS • END MILLS • HOBS

Back of every Lake Shore Tool are the facilities and skilled personnel of one of America's most completely equipped plants.

LAKE SHORE
TOOL WORKS

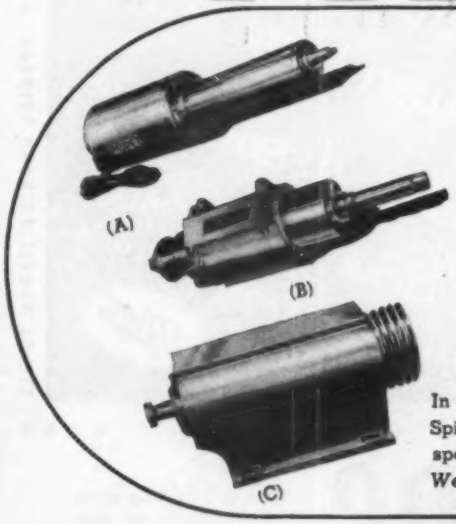
Division of Carbide Tool Company

Send us your blue prints for quotations on your high speed tool, special tool, and carbide production tool requirements.

816 NORTH KOSTNER AVENUE • CHICAGO 51, ILLINOIS

HERE'S ALL THERE IS TO A

POPE *Precision Grinder Spindle*



No oil cups, wicks or fittings — the lubricant is *sealed* in. No chance to inhale dust or grit of any sort. Just a complete, self-contained package ready to work smoothly, coolly and indefinitely at its job of producing superb surface finishes.

There is a size and type of POPE Precision Spindle for every service. Once you try them — see how they perform — you will standardize on POPE Sealed Lubrication Spindles.

Let us mail you new descriptive Bulletin "A" containing complete information.

In the hand is a Tool and Cutter Grinder Spindle. At left is (A) a Surface Grinder Spindle, (B) a special Spindle for winding Glass thread at high speed, and (C) a special Wheel Head for grinding tank and aircraft bearings. You name the job. *We'll* build the one best Spindle for it.

POPE MACHINERY CORPORATION

ESTABLISHED IN 1920

HAVERHILL, MASSACHUSETTS

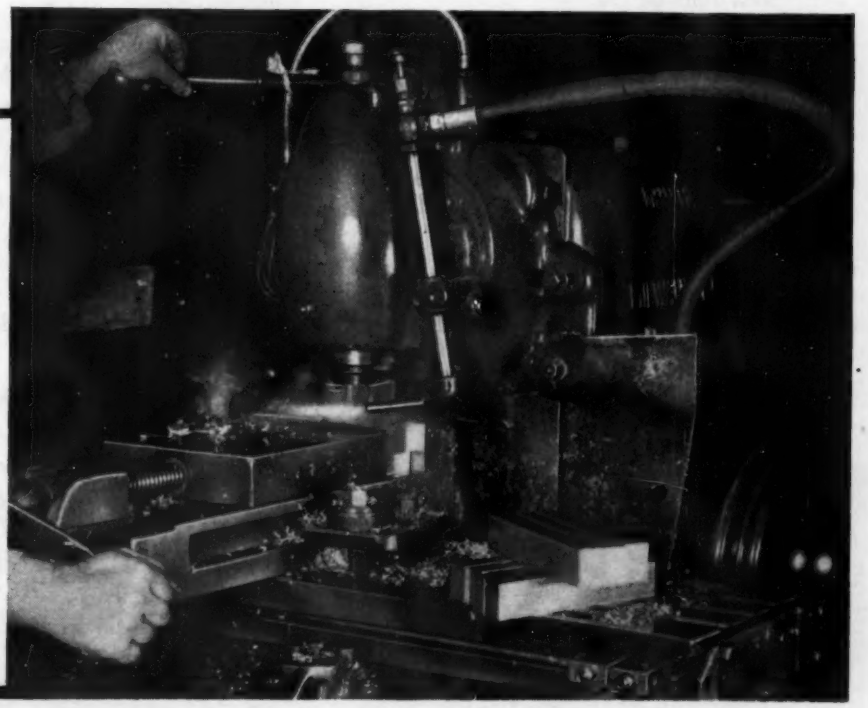
BUILDERS OF PRECISION GRINDER SPINDLES

Official U. S. Army Signal Corps Photograph

AIR ALERT *over there* relies on alertness *here!* To keep *METAL CUTTING* machinery in full wartime production use . . .

. . . SINCLAIR CUTTING OILS and COOLANTS. These oils promote highest cutting speeds and finer finish on all types of metals. They save on power consumption and tool regrind expense. Sinclair provides diversified, specialized cutting oils to suit all individual problems.

(Write for "The Service Factor"—published periodically and devoted to the solution of lubricating problems.)



SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY (INC.), 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Axis Tanks— BEWARE!

THIS little lady is preparing bad news for the Axis. She's helping to turn out land mines—and thanks to Mallory, and to resistance welding, she's doing the job *better* and *faster* than it's ever been done before.

Actually, this operator is welding a seam around the perimeter of the mine case. Notice those Mallory resistance seam welding wheels in the picture. Due to the fact that they're made of Mallory 3 Metal, and that they're used in conjunction with immersion cooling, at least three highly desirable results are accomplished:

First, the welds are strong and completely gas-tight. Second, excess warping is avoided and dimensional stability is maintained. Finally, there's very little time wasted redressing and maintaining the electrode wheels. Mallory 3 Metal reduces such "down time" to the minimum.

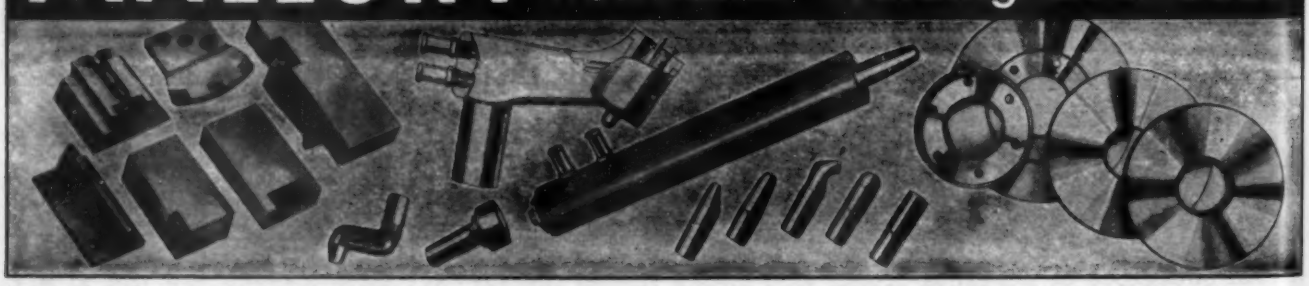
In scores of other war plants—and in hundreds of different applications—Mallory resistance welding electrodes and Mallory "know how" are producing stronger, lighter, more easily fabricated products at lower cost and in faster time. Mallory engineering can help you too—whether yours is a problem of welding non-ferrous metals in similar or dissimilar combinations . . . or whether your method of production requires spot, flash, butt or seam welding. Write today for your copy of the Mallory Resistance Welding Data Book.

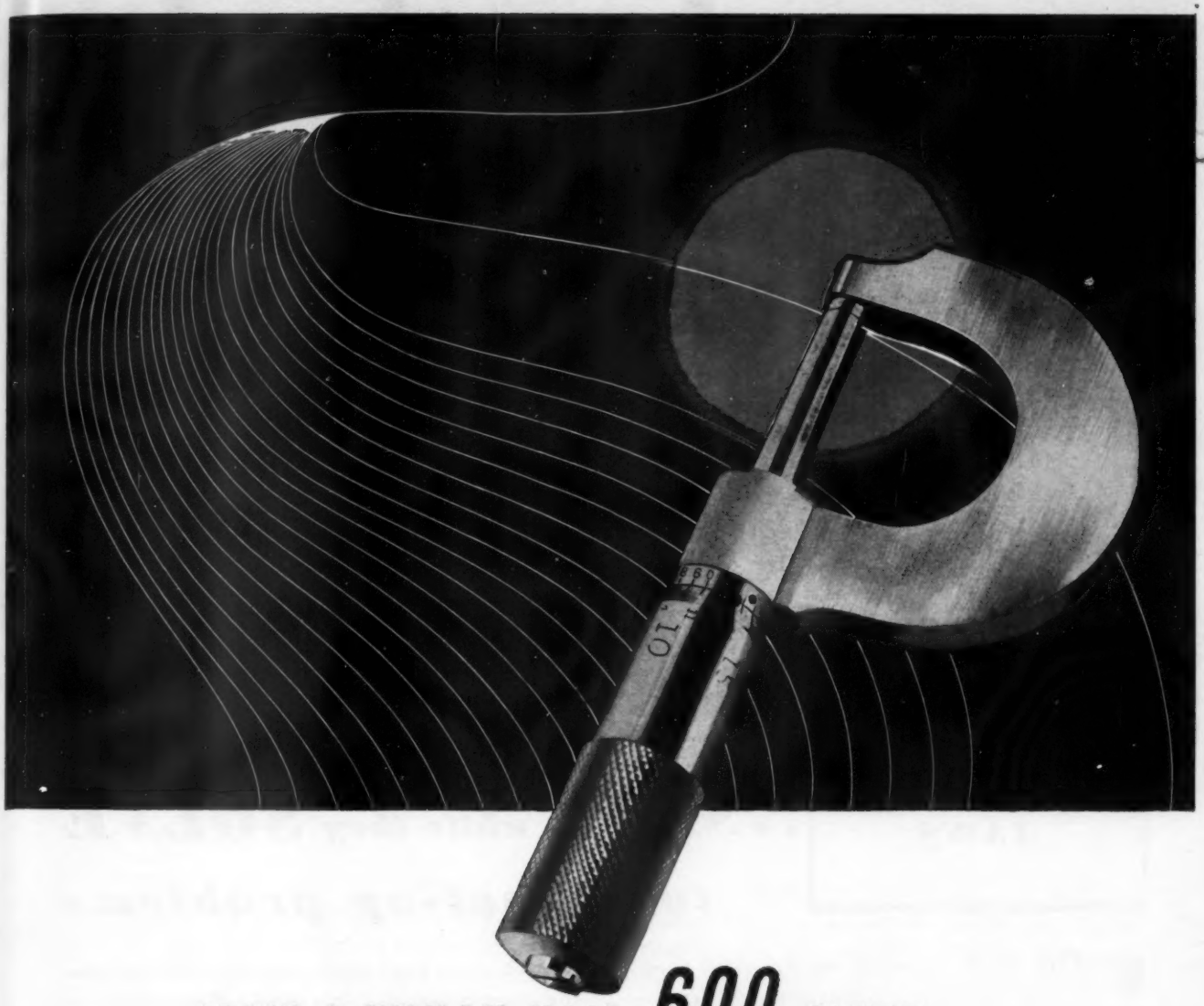
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

Better Buy Bonds

P. R. MALLORY & CO. Inc

MALLORY *Standardized Resistance Welding Electrodes*





SPLIT A HUMAN HAIR 600 TIMES

That is five millionths of one inch. An infinitesimal dimension... a dimension that's part and parcel of every working day at Schrillo... a language that is spoken fluently by our craftsmen. For it's not unusual in this plant to work to .000005" tolerances in the manufacture of Schrillo Precision Products. The industries we serve require it —Schrillo scientific laboratory control assures it.

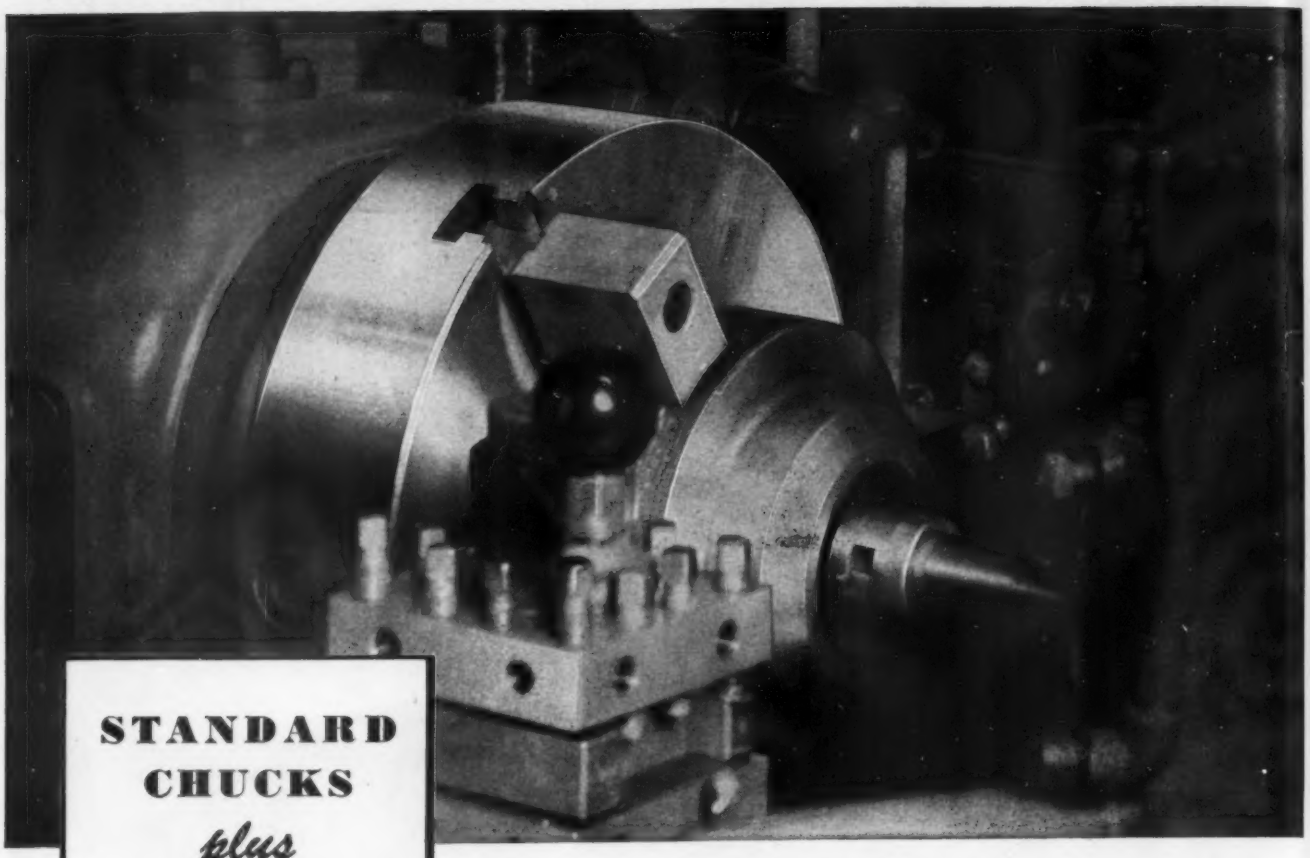
Schrillo Pipe Plugs and Ring Gauges are examples of the meticulous care taken in the manufacture of our products. The unsurpassed accuracy of these gauges is reflected in the increased speed of today's production line operations. For gauges serve not only to determine accuracy of dimensions—they prove the identity of production assembly duplications, assuring perfect interchangeability of parts.

The complete Schrillo line embodies extreme precision of design and manufacture. It includes Thread, Plug, Ring and Special Gauges; Taps, Counterbores, Cutters, Countersinks, Spot Facers, Angle Drives. Specify Schrillo when perfection is essential. Schrillo Aero Tool Engineering Co., 8715 Melrose Ave., Los Angeles 46, Calif.

SCHRILLO

LOS ANGELES CALIFORNIA

PIPE PLUGS AND RING GAUGES BY SCHRILLO



STANDARD CHUCKS *plus* SOFT BLANK JAWS

..SAVE *while they* SOLVE *tough set-up problems*

WITH the development of the American Standard two-piece jaw construction, it became very easy to hold work of unusual shapes or dimensions in standard chucks simply by machining a set of soft blank top jaws to the required form. This saved a great deal of the time and material previously put into construction of special work-holding devices and also made it possible to quickly change a machine over from one job to another by merely exchanging the removable top jaws in the chuck.

This is typical of the time and material saving short cuts that... in a thousand little ways... have enabled American Industry to out-produce our enemies before they thought we could get started. They are going to help make reconversion to civilian production equally successful.

Let Cushman work with you on present and future work-holding problems... and in the interests of Tool Conservation. The Cushman Chuck Company, Chucking Engineers Since 1850 Hartford 1, Conn.

A WORLD STANDARD FOR PRECISION

CUSHMAN CHUCKS

IN cutting stainless steel bars, this plant could get only about 9 hours from a hacksaw blade . . . and many cuts were concaved because of incorrect blade tension. Then a *Red End* Blade was put in the same machine . . . *correctly tensioned by Simonds' new technique* . . . and delivered 17 hours of straight, smooth cutting, *almost double the former blade-life.*

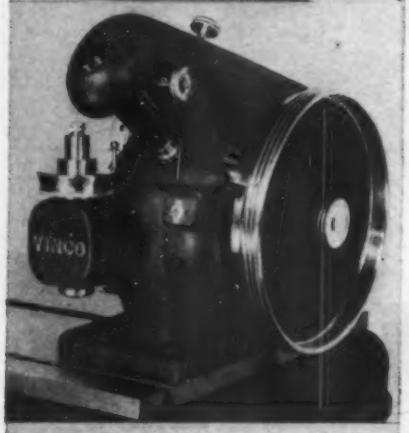
You can get comparable results on *your own* power hacksawing operations, simply by doing this: Have your Industrial Supply Distributor bring a Simonds engineer to demonstrate this new tensioning technique right on your own machines. Then you will see for yourself how correctly-tensioned Simonds Red End Blades will speed up and improve production . . . reduce the need for finish-grinding . . . and keep machines more constantly in operation by sharply increasing life-per-blade. This demonstration involves no cost, no obligation, no interruption of your production. Get in touch *now* with your dealer or distributor, or with the nearest Simonds Branch Office.

Shorten the War . . . BUY BONDS!

BRANCH OFFICES
1350 Columbia Road, Boston—27, Mass.; 127 S. Green St., Chicago—7, Ill.; 228 First Ave., San Francisco—5, Calif.; 311 S. W. First Ave., Portland—4, Ore.; 520 First Ave. So., Seattle—4, Wn.; 31 W. Trent Ave., Spokane—8, Wn.

SIMONDS
SAW AND STEEL COMPANY
FITCHBURG, MASSACHUSETTS

PRODUCTION TOOLS FOR CUTTING METAL, WOOD, PAPER, PLASTICS

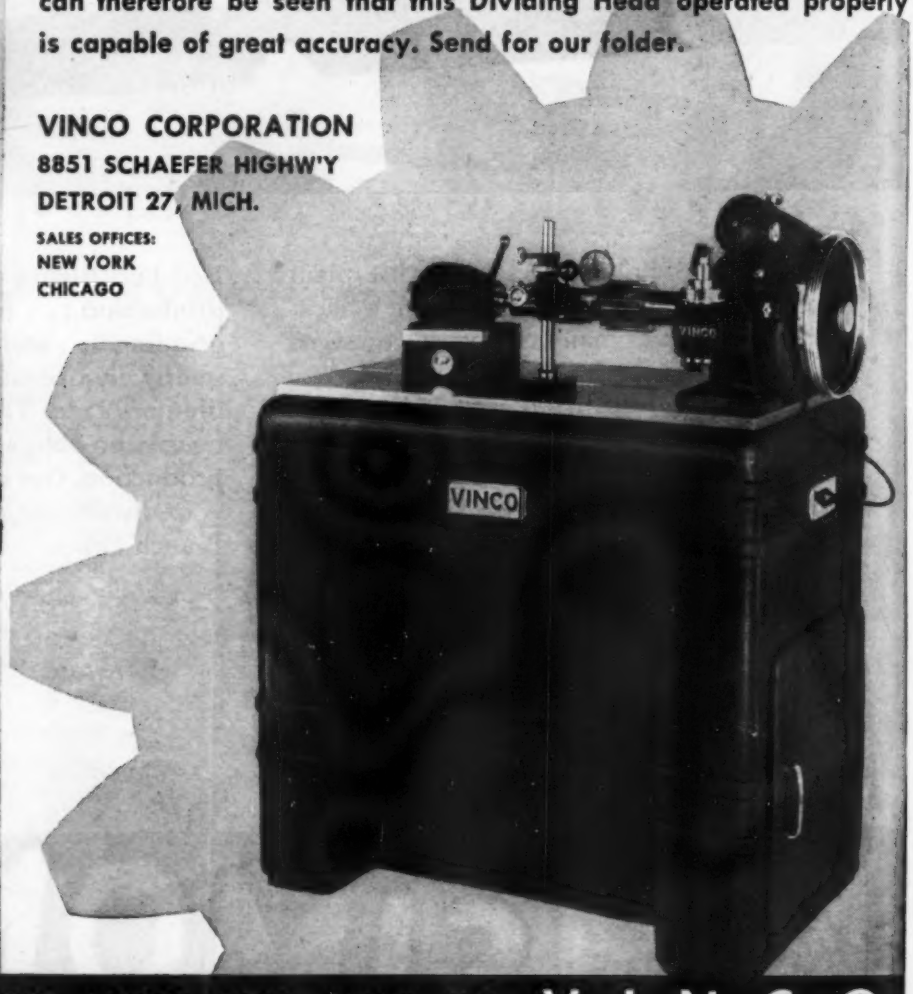


"30 times more accurate"

For the past few years we at Vinco have been producing the Optical Master Inspection Dividing Head using the finest material and the best possible methods and workmanship in its production. We are informed, on high mathematical authority, that our Dividing Head is thirty times more accurate than others being used in inspection. The spindle in each instrument is carefully inspected and checked. The spindle run-out is guaranteed to within twenty-five millionths of an inch, total indicator reading; the average run-out however being approximately fifteen millionths. The Dividing Head is guaranteed accurate to within two seconds of arc, but experienced inspectors are able to match the lines viewed through the microscope to within 12½ millionths of an inch or ½ second of arc. It can therefore be seen that this Dividing Head operated properly is capable of great accuracy. Send for our folder.

VINCO CORPORATION
8851 SCHAEFER HIGHW'Y
DETROIT 27, MICH.

SALES OFFICES:
NEW YORK
CHICAGO



MILLIONTHS OF AN INCH FOR SALE BY VINCO

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Ring Gages and Masters • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power, Control, Utilization and Distribution Units • Engineering, Design and Development

Maybe a Small Fixture will Speed Up PRODUCTION

Illustrated above: operator is burring and polishing 10 parts —spinning against 2 brushing wheels on the same arbor.

HAVE you a brushing job that is now being slowly, laboriously done by hand? Many plants have.

Maybe a small fixture to hold the work would make the operation more automatic—hence faster, better, cheaper.

For instance, a small wooden fixture like the one illustrated can make it possible to brush one or many parts at one time—depending on the size and shape of the work. Many plants have upped brushing efficiency as much as 500% by using this type of fixture. And got a more uniform, better burring, polishing or cleaning job!

It is Osborn's plan to work as closely with customers—in fact, with all industrial brush users—as possible. That was why we originated our famous Osborn Brushing Analysis, whereby we analyze all possible brushing operations and make recommendations.

Today, of course, it is impossible to maintain the *full* service of consultation we have placed at industry's disposal. Our experts simply can't cover the vastly increased ground.

However, we have found that often simply calling attention to the problem suggests a solution.

Of course if you have a critical situation where production is being hindered, we'll do our best to work it into our O. B. A. schedule. There is no charge for this service.

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue *Cleveland, Ohio*

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY

Osborn Brushes

The Collet that "Makes" Precision

The ERICKSON COLLET CHUCK

Collapses 1/32 in. — Retains Gripping Strength and Accuracy.

Collet open at both ends.

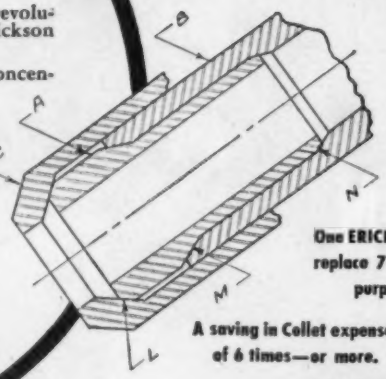
PRINCIPLE

The drawing (right) illustrates the revolutionary principles embodied in the Erickson Precision Collet Chuck.

Collet "A" is automatically lined up concentrically with the axis of the Shank "B" by two Cam Surfaces of the Collet "M and N" mating with the Cam Surfaces of Shank. The Shank and Collet Cam Surfaces are mated to within .0001 inch.

This action aligns Collet with the Axis at the Center of Shank, allowing it to be drawn back by Collet Cam Surface "L" and Nose Piece "C".

Due to the fact that collet is open slotted at both ends, Collet "A" then collapses equally throughout its length to maintain a vise-like grip and remain in perfect alignment with the Axis of Shank.

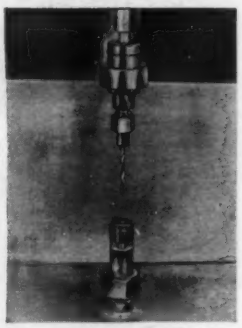


Model "01" accurate within .0005 or less at the nose.

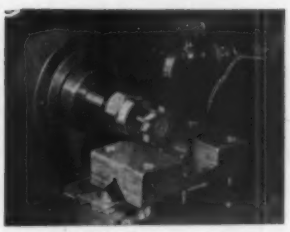
Model "02" accurate within .001 or less at the nose.

One ERICKSON COLLET will replace 7 standard, single purpose Collets.

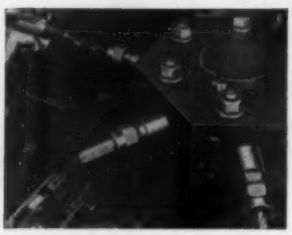
A saving in Collet expense of 6 times—or more.



Model 301 Chuck adapted to quick change production operation on upper spindle. Note self-contained, interchangeable drill bushings in special nose piece on lower chuck.



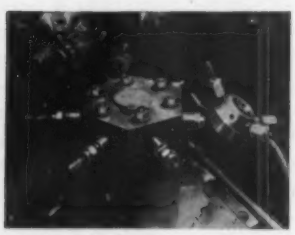
Horizontal Miller with 102 Chuck used to hold Woodruff Key Cutter.



Model 102 Chucks for drilling and tapping operations on Turret Lathe. Jobbers Drill stubbed on chuck in foreground.

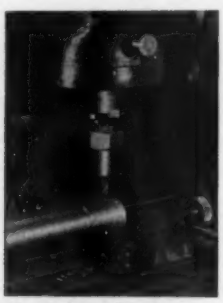
Model 201 used in drill press. Extra long drills can be used, by extending them from the chuck as they wear.

Model 402 Chuck in use on Automatic Screw Machine. Drill gripped on flutes.



Main and auxiliary turrets equipped with Erickson Chucks. Note short drill overhang, taps and reamers.

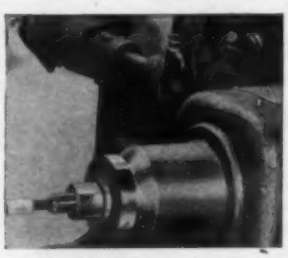
Special Model 202 Chuck used in Hand Drills in Aircraft Industry. 01 Models are regularly recommended for Hand and Air Drills.



Vertical Milling operation with 101 Chuck.

Tool Post Grinder equipped with Model 301 Chuck.

Model 201 High Speed Router Chuck with extend nose piece for pattern following.



Model 301 Chuck designed for high speed internal grinding operations.

SEND FOR BULLETIN "E"

Model 102 Chuck—adapted for standard floating holder operations.

Models 102 and 402 Chucks in use on Automatic Screw Machine.

ERICKSON STEEL COMPANY • 2309 Hamilton Ave., CLEVELAND 14, O.

You Can SPEED UP YOUR PRODUCTION

on Threaded Parts for Tanks, Guns, Bombs, Shells—with

MURCHEY

THREADING TOOLS

Type "B-M" Collapsible Machine Tap
Saves production time. Increases machine capacities. Insures instantaneous action. Gives greater accuracy of thread lengths.

4 Weeks Delivery

Murchey gives you the better, faster and more accurate threading you need to speed up your production on threaded parts. And Murchey quick delivery enables you to start your increased production schedules much sooner. Hurry and get full information on Type "B-M" Collapsible Machine Tap and Type "G" and Type "C-O" Self Opening Die Heads.

Catalogues on request—write today. Also get information on Murchey Thread Milling Machines, Shell Tapping Machines, and Roller Pipe Cutting-off Machines.

MURCHEY MACHINE & TOOL CO.
DEPT. A • DETROIT 26, MICHIGAN

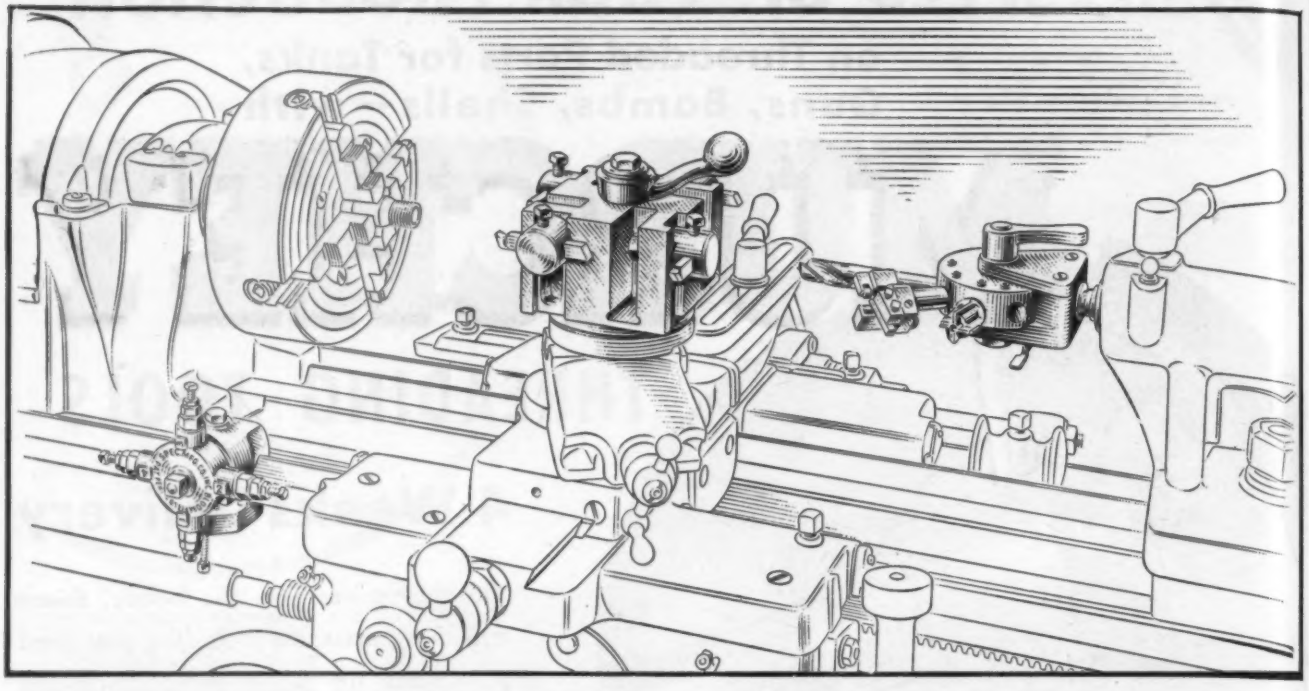
Type "C-O" (rotating) Self Opening Die Head
A companion to Type "G" for use on machines where the die head revolves. Takes the same chasers as well as many parts of Type "G".

Type "G" (non-rotating) Self Opening Die Head
Designed and engineered for use on any machines where die heads do not rotate. Made in sizes from 7/16" up to and including 6".

MURCHEY

Turret lathe performance from engine lathes!

Get it *quickly* with these *proved* attachments



Specialties Cross-Slide Turret—gives you four working positions without time loss for tool changes . . . enabling you to do multiple machining operations on the same lathe. Easy to operate—merely flip turret clockwise or counter-clockwise, from one index position to another. Tool bits can be rotated to any angle for desired clearance angles on tools.

Specialties Tail-Stock Turret—quickly converts engine lathe into 4-way turret lathe for end work. You can perform four different operations—roughing, tapping, boring, finishing—with the four positions of the turret. Cuts machining costs.

Specialties Lathe Stop—for multiple operations—eliminates repeated measuring—speeds up production. You measure only once for each operation. Once the four measuring positions are set, you just index. Index pin automatically centers and locks spacer arm.

Why wait for new turret lathes when you can do any kind of work with these three time-saving devices? Mail the coupon for complete details on Specialties lathe accessories for increasing production —at relatively low cost.

SPECIALTIES
MANUFACTURING COMPANY, Inc.

SPECIALTIES Manufacturing Co., Inc.
41 Farrand Street, Bloomfield, N. J.

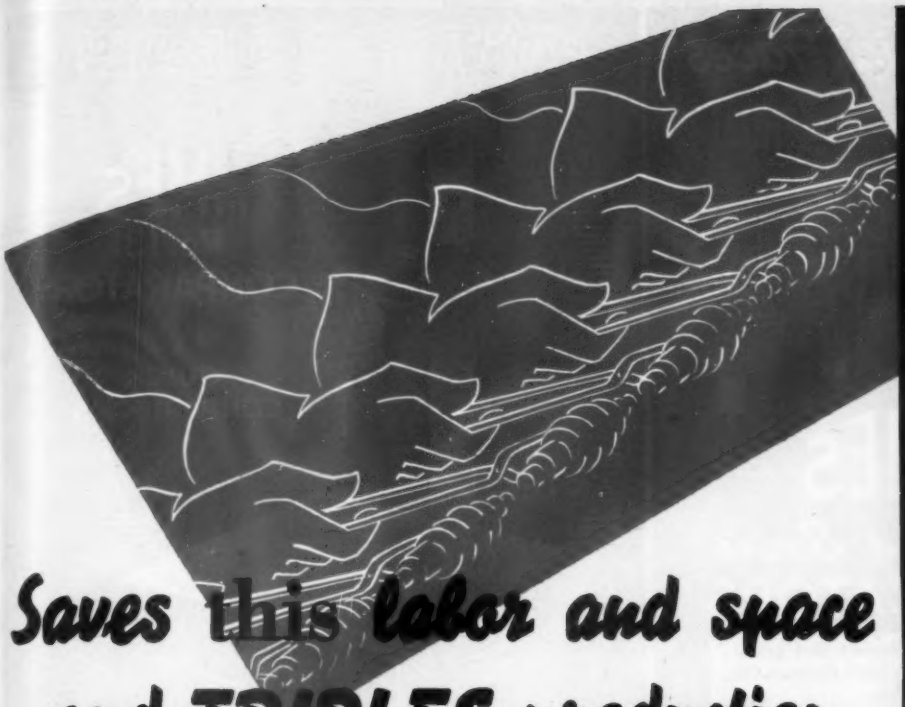
Please send me full information on SPECIALTIES lathe accessories.

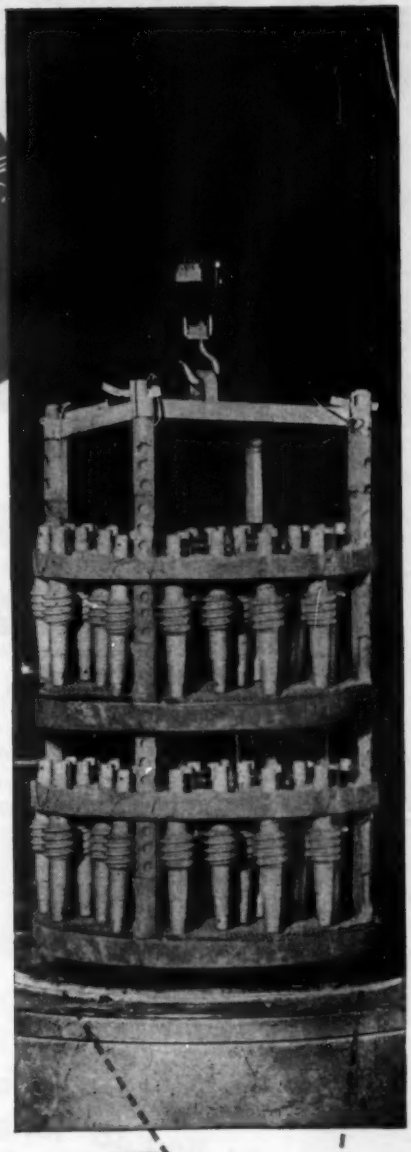
Name_____

Company_____

Address_____

City_____ State_____





Saves this labor and space and TRIPLES production

Lindberg Super Cyclone Furnace

ONE TYPICAL user by handling 100 worm gears per load, *increased production 3 times.*

This great improvement is possible because the work is confined in a small area and the heat is driven through the load at high velocity. Then the entire load is quenched at once, without piece-by-piece handling.

These are advantages of the principle of heating solely with fan-driven hot air which, in the Super-Cyclone, builds up temperature with rapid uniformity to as much as 1750°F. *throughout the charge.* Other advantages include keeping work straighter because there is no one-sided heat to cause distortion. Each piece and the complete mass of each piece is heated at the same rate.

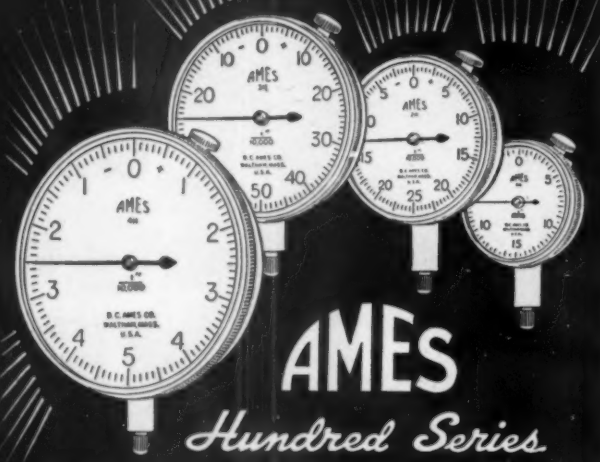
And the versatile Super-Cyclone can be used for normalizing, hardening and tempering, with a temperature range from 300° to 1750°F. Lindberg furnaces can save for you too . . . write us now for complete information. Lindberg Engineering Company, 2445 W. Hubbard St., Chicago 12.

LINDBERG FURNACES

ARMY E NAVY

SUPER-CYCLONE for hardening, normalizing, annealing, tempering
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening

4 Sizes ~ 14 Dial Faces



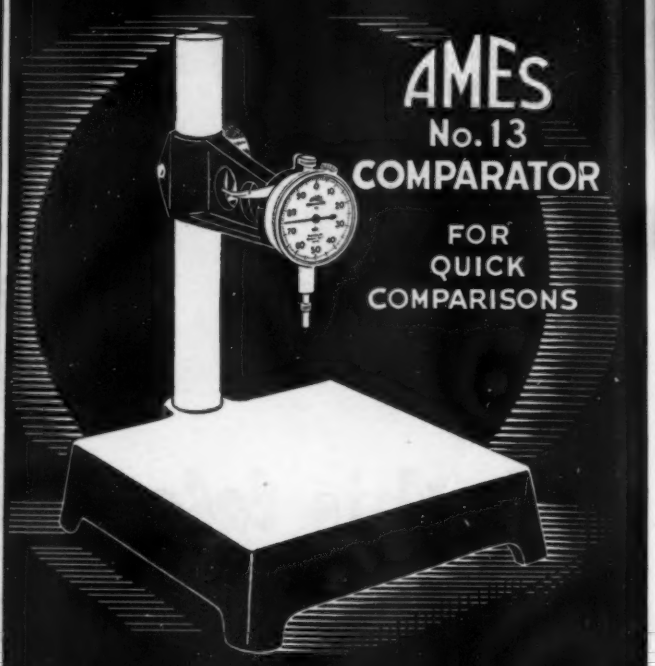
AMES
Hundred Series
DIAL INDICATORS

In four sizes with fourteen different dial graduations, indicating thousandths, half-thousandths or tenths of thousandths inches.

Speedy, accurate, inexpensive and adaptable to various measuring and testing jobs.

Write today for catalog.

FAST ◦ ACCURATE

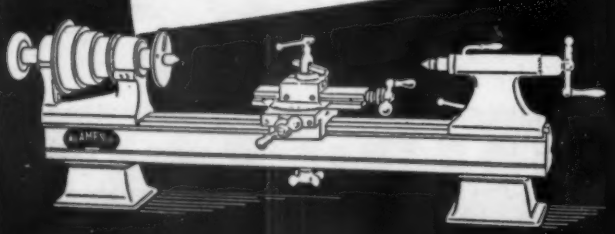


AMES
No. 13
COMPARATOR
FOR QUICK COMPARISONS

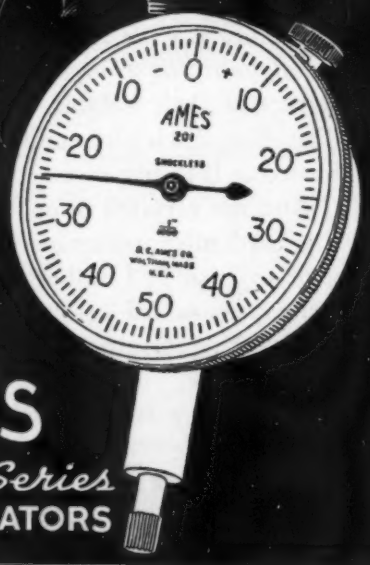
AMES *Precision* BENCH LATHE

Known for 40 years as a precision lathe of the highest quality. Bed 36" long. Ball bearing headstock uses 1" capacity collets. Swing 8 3/8" over bed. Available with motor drive.

Send For Catalog



Shockless in Four Sizes



AMES
Hundred Series
DIAL INDICATORS

B.C. AMES CO. WALTHAM, MASS.

Cutting oil *News* letter

Practical suggestions from the field on how cutting oils and coolants are being used by midwest machine operators to lick tough wartime jobs.

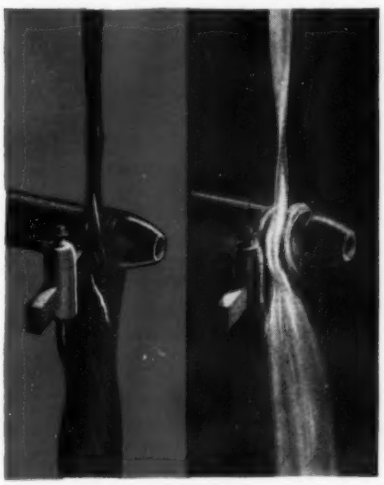
FEBRUARY, 1944

Find thread chasers an awful grind? Try Stanicut. Dies for threading aluminum parts taxed the tool department in an Illinois war plant. In cutting a 1⅛"—16 external thread, chasers had to be ground every three days. Then Stanicut 137BCS was put on the threading operation. Dies lasted 25 days before they needed regrinding. Less grinding meant less tool stock wasted, less tool maker's time needed, and more parts produced.

Outboard motor used as an agitator in big soluble oil tank

Big saving for big soluble oil user. Soluble oil is used in large quantities by a manufacturer turning out 105 mm. shells. The central mixing tank which feeds the machine is so large it is agitated by an outboard motor. When this war job was started no expense was spared to avoid trouble. A rich solution of an expensive oil was used. Later, tests of other oils were made. Superla Soluble Oil was one of these. With it, mixes as high as 25 to 1 are doing finished work satisfactorily. These lean mixes of Superla have cut soluble oil costs to ⅓—a 4-figure saving yearly at this plant.

Cutting oil in place of kerosene doubles tool life. Machining bronze on a turret lathe wasn't a particularly difficult job at one Indianapolis plant. Kerosene was used as a coolant. Its viscosity was low, it did not stain the work, and it was easy to get. But tool life wasn't exactly good. One of the new Stanicut oils, developed to meet the increase in machining of non-ferrous metals in war plants, was tested. It, too, had the right viscosity and cooling qualities, did not stain the work, and was readily available. But it also doubled tool life. Take advantage of new cutting fluid developments by talking over your machining, grinding, and stamping problems with a Standard Cutting Oil Specialist.



Cutting oil or soluble oil? When in doubt try Stanicool H. D. Many factors enter into the question of which coolant to use, cutting oil or soluble oil. Sometimes neither does the *whole* job. With a soluble oil, even in concentrated mixes, tool life may be poor. With cutting oils, cooling may be inadequate, resulting in poor finish and burned tools.

Stanicool H. D., a heavy-duty soluble oil, has been the answer in many plants. The job of boring, turning, and facing forged gear blanks was one example at a central Illinois plant. Excessive smoking and overheating occurred when a cutting oil was used. A conventional soluble oil gave poor tool life. Stanicool H. D. mixed 7 to 1 eliminated the smoking. Gear blanks came off of the machine considerably cooler. Stanicool H. D. gave satisfactory tool life plus an extra dividend in lower oil costs.

What are YOUR problems?

The few examples cited here are typical of jobs Standard Cutting Oil Engineers are doing daily for operators who have asked for help. Take the time to explain your problems to one of these Engineers. He may have a number of suggestions that will help you save much needed manpower, materials, and tools. Call any Standard Oil Company (Indiana) office, or write 910 South Michigan Ave., Chicago 5, Ill., for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

Oil is Ammunition . . . Use it Wisely

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ LUBRICATION ENGINEERING

•LUBRICATION ENGINEERING••LUBRICATION ENGINEERING••LUBRICATION ENGINEERING••LUBRICAT

• • LUBRICATION ENGINEERING • • LUBRICATION ENGINEERING • • LUBRICATION ENGINEERING • • LUBRICA

Lubrication *News* letter

Practical suggestions from the field on how Lubrication Engineering and lubricants are being used by midwest operators to lick tough wartime jobs.

FEBRUARY, 1944

Compressor fire hazard reduced. Excess oil in the receiver of multi-stage compressors is never desirable—it can be dangerous. When heavy loads, long hours of operation, or faulty cooling units allow operating temperatures to rise it presents a definite fire hazard.

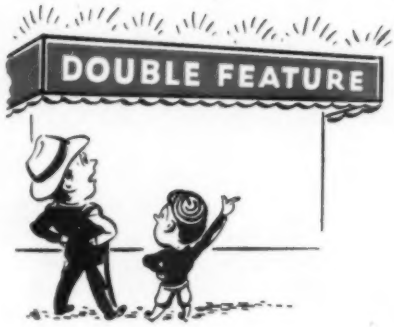
A Michigan war plant found it out the hard way—by experience. After one or two "experiences" which left no doubt that something had to be done, a Standard Lubrication Engineer was called in. He made three suggestions:
1. Lower intake air temperatures.
2. Lower cooling water temperatures in the after-coolers. This not only cools the air, but also condenses oil vapor before it is carried over into the receiver.
3. Lastly, but of first importance, use a better oil so that less is needed to secure adequate lubrication.

In this case Stanoil 31 was the answer. After three months' use there has been no recurrence of receiver fires, and oil consumption has been reduced 50% with adequate lubrication of the compressors.

P. S. to the above. As an added attraction, Stanoil and the Lubrication Engineer also cured a long standing problem on this Michigan plant compressor. Windings on the compressor motor were oil soaked. The Engineer pointed out that Stanoil's high V. I. (viscosity index)—a quality which prevents it from thinning out excessively when temperatures go up—would keep the oil *in* the motor bearings and *off* the windings. It did just that. The saving in maintenance this made was almost as important as the 50% saving in oil consumption mentioned above.

Two reasons why some Hydraulic Oils go bad—and Stanoil doesn't

Viscosity increase and acidity are two signs of deterioration in hydraulic oils. Either may make hydraulic oils unfit for further use.



An excessive increase in viscosity makes operation sluggish in most hydraulic systems. High oil acidity causes deposits, oil discoloration, and poor separation from water which may result in foaming and erratic operation if there is moisture in the system.

Stanoil is made to reduce both of these troublesome causes of hydraulic oil failure, not just in laboratory tests but in actual service. For example, a Lansing, Michigan plant uses a large quantity of hydraulic oil. Because of this an accurate check is maintained on oil condition. Records from this plant show a typical sample of Stanoil No. 18 after 2392 hours of almost continuous operation to have the same viscosity as unused oil, and a neutralization number of only 0.15. Stanoil has operated in this plant for periods as long as 7200 hours with no appreciable change in viscosity or acidity, and it has not been necessary to change oil in some units in over a year.

If you are obliged to change hydraulic oil frequently or have deposit trouble, erratic operation, or persistent foaming, let a Standard Lubrication Engineer analyze your problem. A change in the hydraulic system or a change to Stanoil, or both, may save labor, down time, and oil.

What are YOUR problems in maintenance and lubrication?

The few examples cited here are typical of jobs Standard Lubrication Engineers are doing daily for operators who have asked for help. Take the time to explain your problems to one of these Engineers. He may have a number of suggestions that will help you save much needed manpower, material, and scarce equipment. Call any Standard Oil Company (Indiana) office, or write 910 S. Michigan Avenue, Chicago 5, Illinois, for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

Can't throw Stanodrip. Lubrication of stitching machines making wire bound boxes is a tough job. Action of many parts on the machine is very rapid and jerky. Ordinary lubricants tend to fly off in all directions. Oil on the box wood spoils the work. Oil on operators means less oil stays in the machines.

Machine operators were the first to cheer for Stanodrip when it was tested. They got less spoilage, less trouble from machines because of too little lubricant, and spent less time putting oil on the machine and taking it off of themselves. Stanodrip is on this job to stick.

Oil is Ammunition . . . Use it Wisely

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ LUBRICATION ENGINEERING

THE HOW AND WHY OF WILLIAMS DROP-FORGED TOOLS

THE PROPER USE OF OPEN-END WRENCHES . . . Data Sheet No. 22

First, select a wrench with the correct size opening for the nut or bolt to be accommodated. Test this by the amount of free back and forth movement of the wrench on a stationary nut. Too large an opening may slip under a hard pull and injure you, the nut, or the wrench.

Any wrench will perform best and with highest strength when squarely and fully seated on the nut or bolt head as shown above. Pull straight, avoiding side strain or "cramping" of the wrench. Nine times out of ten you will find it safer to *pull* rather than *push* on a wrench. Greasy hands... or greasy wrenches... are dangerous. A dry, clean grip always permits the hardest, safest pull and helps to reduce accidents.

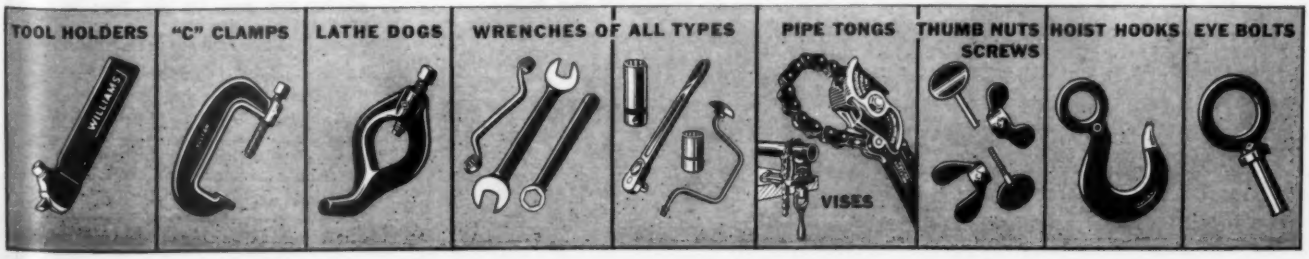
Never use a wrench with a badly worn or chewed and spread opening as pictured above—particularly on hex nuts. Williams' Wrenches are stamped with the nominal size of their openings; that is, the size of the nut or bolt head across the hex or square flats. Openings are made .005" to .040" (proportionate to size) larger than the nut or bolt head they are intended to fit. It is, therefore, easy to detect spread openings.

Standard commercial wrench leverages are such that an average man can readily break bolts or strip threads up to 5/8" bolt diameter. Consequently care should be exercised and a sense of "feel" developed. Bolts larger than 5/8" seldom can be set up too tight with average wrench leverages. If you must use auxiliary leverage on large bolt sizes, such as a pipe extension over the handle, make sure the two are strongly and well coupled. The best and safest procedure is to purchase special wrenches with extra long handles.

Never hammer an ordinary wrench handle as a substitute for increased leverage. *Striking-face* wrenches, (see above illustration) made specially for this purpose, should be used. A vast amount of energy is stored in several sharp hammer blows, and ordinary wrenches are not designed to withstand this abuse.

When the usual open-end wrench is operated in close quarters on hard-to-get-at nuts, it should be remembered that "flopping" the wrench upside down between swings gives an angular advantage which permits continuously rotating the nut, or bolt in the least possible space. By this "flopping" trick, illustrated above, the usual 15° angle wrench will operate a hexagon continuously where the swing is limited to 30°; otherwise 60° would be necessary.

Sold by Leading Industrial Distributors Everywhere . . . J. H. Williams & Co., Buffalo 7, N. Y.



"Yesterday's Pioneer — Today's Leader"

WELDON REPRESENTATION *is Nation-Wide*

Wherever you are located—East, West, North, South—there's a Weldon representative within easy reach of you, ready and willing to give you prompt, intelligent service. When you need End Mills, Screw Machine Cutting Tools, or other Weldon Tools, write or telephone the nearest representative listed below:

CAMPBELL HARDWARE & SUPPLY CO.
108 First Avenue
Seattle 4, Washington

CANADIAN FAIRBANKS-MORSE CO.
26-28 West Front Street
Toronto, Ontario 1, Canada

DAYTON INDUSTRIAL SUPPLY CO.
257 Wayne Avenue
Dayton, Ohio

JOHN DI EUGENIO
P. O. Box 1465
Avondale, Arizona

ENGINEERING SALES CO.
112 Portwood Street
Houston 1, Texas

ENGINEERING SALES CO.
1124 Allen Building
Dallas, Texas

ENGINEERING SALES CO.
308 Carondelet Building
New Orleans 12, Louisiana

JOSEPH C. FLETCHER
1415 Folsom Street
San Francisco 3, California

THE GENERAL TOOL CO.
325 N.W. 15th Avenue
Portland 9, Oregon

MALCOLM GRANT
2543 Arunah Avenue
Baltimore, Maryland

F. H. HARRIS CO.
340 Main Street
Worcester 8, Massachusetts

HENGER-FAIRFIELD CO.
124 East 7th Street
Cincinnati 2, Ohio

RICHARD IVES COMPANY
Security Building
Denver, Colorado

MACHINISTS' TOOL & SUPPLY CO.
3690 Santa Fe Avenue
Los Angeles 11, California

McMULLEN TOOL SUPPLY CO.
6400 Epworth Boulevard
Detroit, Michigan

OSCAR A. MUENZ CO.
932 East Main Street
Bridgeport 8, Connecticut

OSCAR A. MUENZ CO.
790 Broad Street
Newark 2, New Jersey

PYE-BARKER SUPPLY CO.
244 Forsythe Street
Atlanta 3, Georgia

WALTER F. STEGNER CO.
20 North Wacker Drive
Chicago 6, Illinois

WALTER F. STEGNER CO.
757 No. Broadway
Milwaukee, Wisconsin

VOSS MACHINERY COMPANY
2882 West Liberty Avenue
Pittsburgh 16, Pennsylvania

WM. L. WALDECK
Lincoln-Alliance Bank Building
Rochester 4, N. Y.

KURT P. WESSELING
1221 Locust Street
St. Louis 3, Missouri

THE WILLIAMS HARDWARE CO.
100 Second Avenue, North
Minneapolis, Minnesota

WRIGHT & GADE EQUIPMENT CO.
3701 North Broad Street
Philadelphia 40, Pennsylvania

JAMES A. SHATTUCK
2443 8th Street
Cuyahoga Falls (Akron), Ohio

E. L. NAVARRE
1408 Mishawaka Avenue
South Bend, Indiana

ENGLAND: ACORN MACHINE TOOL CO., Westbury Brackley, Northants, England

We can make immediate shipment of most sizes of WELDON End Mills. Write for stock list.

THE WELDON TOOL CO. *Cleveland 4, Ohio*

3000 WOODHILL ROAD

Accuracy AT A GLANCE

The Master "Streamline" steel tape rule is designed for engineers, draftsmen, foremen, designers — in fact anyone to whom accurate measurements make a difference.

The "Streamline" can be used for inside as well as outside measurements. It is adaptable as a scriber, height gauge, for layout work and standard bench measurements. The patented precision lock holds all measurements. Simple sturdy construction makes it easy to insert the new spare blade (a feature exclusive with "Streamline") which doubles the life of the rule. Graduations on both sides and all edges of blade.

Write now for your free copy of this new 16 page pocket sized manual "Rules for Measurement."

$2.65 each complete with spare blade

MASTER
WOOD AND TAPE RULES

MASTER RULE MFG., CO., INC., Dept. P2
815 E. 136th St., New York
Branch: 541 S. Spring St., Los Angeles, Calif.

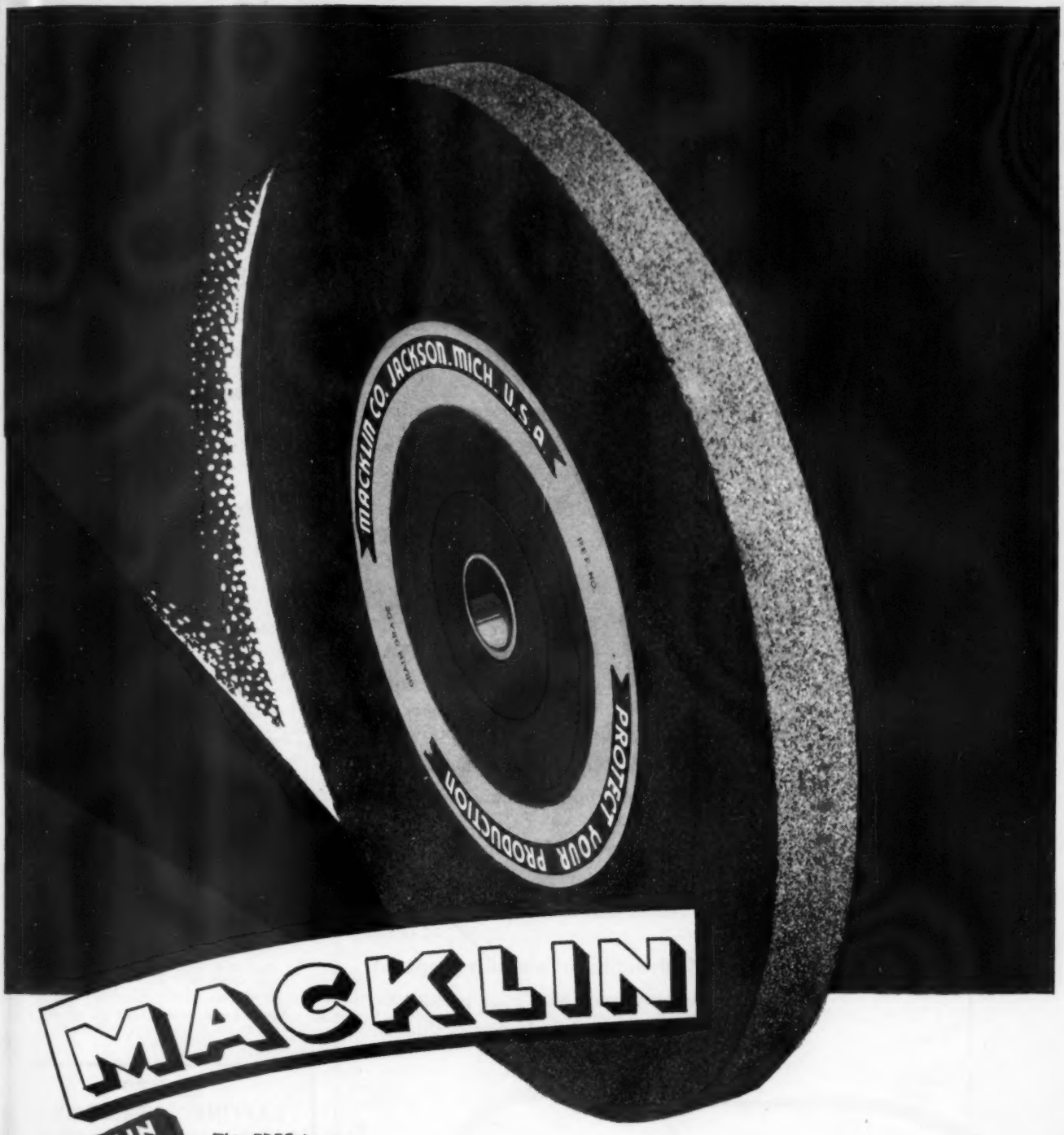
Enclosed please find $2.65 for 6 ft. "Streamline" steel tape rule and spare blade.

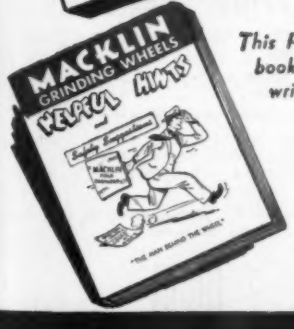
Name_____

Address_____

City_____ State_____

6501





This FREE 64-page book still available, write for your copies.

MACKLIN HIGH QUALITY WHEELS FOR EVERY GRINDING PURPOSE WILL

"PROTECT YOUR PRODUCTION"

Ask for the services of a Macklin Field Engineer

MACKLIN COMPANY

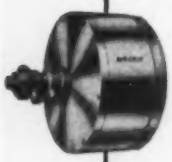
Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

Sales Offices: — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

At Least 25% more output

Production will go up at least 25% when you install "Airgrip" Chucks and Revolving Cylinders. You will get more power than you need—holding power that will not fail up to the limit of machine power and tool endurance—power that means you can work every "Airgrip" equipped machine at its absolute maximum.



"Airgrip" Chucks, made in both two-jaw and three-jaw types, permit heavier cuts, coarser feeds—faster production—more parts per hour—at lower cost per unit.

"Airgrip" Revolving Air Cylinders embody the features which make for top performance and minimum maintenance.

Install "Airgrip" Devices now! Produce more for war and be ready to enter peacetime markets faster and at competitive prices.

Anker-Holth engineers are fully prepared to help you now with your pneumatic and hydraulic problems.

• This is the new Hi-Po super-charged hydraulic pump that delivers smooth, chatter-free power at 3000 lb. pressure. It is driven by a ½ hp. motor.

Anker-Holth Mfg. Co.

332 S. Michigan Ave. Chicago 4, Ill.

LAPPING COMPOUNDS

made expressly for precision lapping

• GAGES •
• DIES • TOOLS •
• INSTRUMENTS •

PLATE . . . MACHINE . . . HAND

• The abrasives are suspended in a special grease composition paste base that becomes an oily film under pressure of lapping. This base was developed expressly for hand, plate and machine lapping.

For dilution or extra lubrication mix with small quantity of thin film oils such as kerosene, spindle.

★

MEDIUM COARSE
Grade No. 302½.....60¢ per lb.

MEDIUM FINE
Grade No. 303½.....60¢ per lb.
Above packed in 10½ and 52 lb. cans

EXTRA FINE
Grade No. A-600
Crystolon .....75¢ per lb.
TM. Reg. U. S. Patent Office (silicon carbide)
Grade No. A-600
Alundum .....75¢ per lb.
TM. Reg. U. S. Patent Office (crystalline alumina)

VERY EXTRA FINE
Grade No. 2600A.....90¢ per lb.
Grade No. A-20X.....90¢ per lb.
Grade No. 38-900A.....90¢ per lb.
(special chrome plate)
Grade No. GK-7A.....90¢ per lb.
(high reflective finish on steel)
Packed in 8½ and 42 lb. cans
Large Glass Jars, all Grades .....$1.00 each

Sample carton containing 1 oz. jar of each of the above compounds mailed post paid upon request.

"LMKT" LAPPING LUBRICANT
A substitute for sperm oil on lapping operations.
Single gallon cans.....$2.00 per gal.
Six—1 gallon cans.....$1.75 per gal.

Also many other compounds: Valve Grinding, Gear Lapping, Ball Bearing Raceways, Finishing, Polishing—All Types. Write us for samples.

Recommended by Norton Company for use on their Lapping Machines.

USP

UNITED STATES PRODUCTS CO.
518 MELWOOD ST., PITTSBURGH, PA.

STEP-UP YOUR PRODUCTION CARBURIZING with Park No. 8 N.B. CARBURIZER

PROVE
it to Yourself!

Prove to yourself that Park's No. 8 carburizer is superior to charcoal-coke compounds for small parts. Send in your order today for a trial run.

IMMEDIATE DELIVERY!

All orders for Park No. 8 carburizers can be shipped the same day they're received.

Manufacturers and commercial heat treating companies have been unanimous in their claims that Park No. 8 non-burning carburizer is far superior to other carburizing compounds for the production carburizing of small parts.

They base their claims upon the satisfactory results obtained in using Park No. 8 N.B. carburizer. They have found the fine texture of Park No. 8 to be ideal for thoroughly covering the smallest parts, thereby insuring uniform case depths at all times. A saving in labor was also effected by the elimination of:

1st: Hand packing operations;

2nd: Frequent changing of the carburizer (because No. 8 is non-burning it can be used over and over).

These advantages plus the added features listed at right prove that you can realize definite savings in carburizing small parts when you use Park's No. 8 N.B. carburizer.

For complete information and prices about Park No. 8 carburizer wire or write us today.

★ Features ★

1. NO REMIXING NECESSARY. Park No. 8 can be used over and over.
2. NO BURNING LOSS. Park No. 8 does not burn after dumping.
3. NO CHANCE TO EXPOSE PARTS THROUGH SHRINKAGE. Due to low initial shrinkage of Park No. 8 exposure of parts is not evident.
4. NO INDIVIDUAL HAND PACKING with Park No. 8. Parts can be shoveled into box.
5. TIME SAVED IN EMPTYING BOXES. Can be emptied by placing fine screen over drum and dumping.
6. UNIFORMITY OF RESULTS. Coke build-up eliminated, all parts covered by free flowing Park No. 8.
7. FASTER COOLING OF POTS. Hours saved by non-burning Park No. 8.
8. TIME SAVED IN CLEANING COMPOUND. Seldom necessary to clean Park No. 8.

Park

PARK CHEMICAL CO.
DETROIT MICHIGAN

● Liquid and Solid Carburizers ☆ Cyanide, Neutral and High Speed Steel Salts ☆ Lead Pot Carbon ☆ Charcoal ☆ Coke ☆ No Carb. ☆ Carbon Preventer ☆ Quenching and Tempering Oils ☆ Drawing Salts ☆ Metal Cleaners ☆ Liquid Grain Cement

8074 MILITARY AVE. DETROIT, MICH.

4 SPINDLE HOEFER HEAD ELIMINATES SEPARATE HANDLING OF AN UNWIELDY PART . . .

A 5 h. p. Hoefer Hydraulic unit on which is mounted a 4 spindle HOEFER Head carried on guide bars. Tied into the fixture through a mounting bracket the head became a part of a large Ingersoll Multi Station Boring Machine performing operations on a tractor crank case. The four holes are at a 30° angle to all other operations and are done during the time of the other operations. The control is hydraulic, automatically starting our unit with its four spindle head by the index plunger of the trunion entering its bushing. In this way a separate handling of an unwieldy part was eliminated and the extra jig for these holes was not necessary.

In our more than thirty years of concentrated effort in designing and building Multiple Spindle Heads we have produced this equipment for unlimited applications and in designs of every conceivable construction.

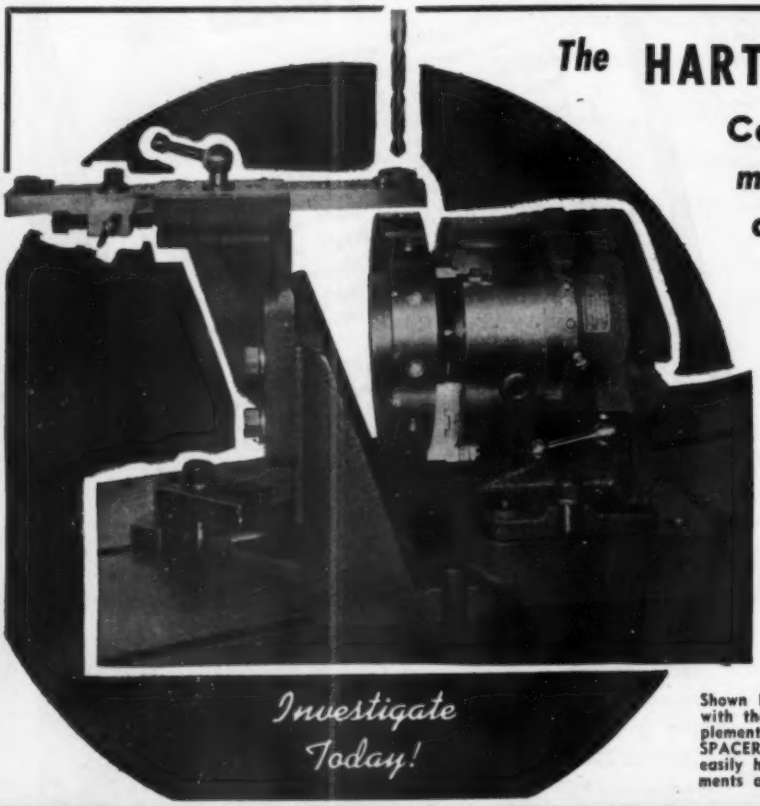
If you have a multiple drilling problem, the chances are we have furnished a multiple spindle head for similar use. Our engineering department is ready to work with you now to determine the right head for your job.

Hoefer's Whole Business is Holes . . . .

HOEFER MFG. CO. *Freeport, Ill.*

The HARTFORD SUPER-SPACER

Contributes to greater, faster, more accurate production on a wide range of operations



Investigate Today!

The HARTFORD SUPER-SPACER has already proved itself a tool of exceptional value in war production plants for the rigid control of accurate machining operations. It is simple, compact and rugged in design and provides a work holding capacity which makes possible the utilization of speeds and feeds up to the power of the machine on which it is used. With its attachments and fixtures, it is adaptable to milling, drilling, grinding, jig boring and slotting. Indexing is rapid and positive, mask plates removing all possibility of error. Skilled operators are not required.

Plants in all parts of the country have found the SUPER-SPACER the answer to many problems in the tool room and on the production line. It will pay *you* to investigate.

Shown here is a typical radial drilling indexing job being handled with the SUPER-SPACER equipped with Drilling Attachment. A supplemental base is used to secure the attachment to the SUPER-SPACER. Variations of diameter and length of radial drilling are easily handled. Set-up time is negligible. Hartford Drilling Attachments are available for all SUPER-SPACERS now in service.

THE HARTFORD SPECIAL MACHINERY COMPANY

HARTFORD CONNECTICUT

NOW READY FOR YOUR USE!

NEW U. S. OFFICE OF EDUCATION 16 MM. MOTION PICTURES

For increasing Worker Skills in Critical WAR JOBS!

IMMEDIATELY AVAILABLE ON MACHINE SHOP WORK!

(Order No.)

179. The Slide Rule
56. Cutting an Internal Acme Thread
62. Using a Steady Rest
63. Using a Follower Rest
90. Sharpening a Side Milling Cutter
91. Sharpening a Plain Helical Cutter
92. Sharpening a Shell End Mill
93. Sharpening a Form Relieved Cutter
94. Sharpening an Angular Cutter

Many more subjects on machine shop work, now in production, will be ready soon!

ALLIED SUBJECTS READY!

While listed under specific industries, these films are so basic that they can be used wherever machine shop work is vital.

AIRCRAFT WORK

128. Sawing Template Metal
129. Filing Template Metal
130. Blanking Sheet Metal on the Squaring Shear
131. Blanking Sheet Metal with Hand Snips
135. Finish Forming by Hand
142. Tube Bending by Hand

SHIPBUILDING SKILLS

105. Measuring Pipe, Tube, and Fittings
106. Cutting and Threading Pipe by Hand
107. Cutting and Threading Pipe on a Power Machine
108. Making a Cold Bend on a Hand-Powered Machine
109. Covering Hot and Cold Pipes

Also farm work subjects of value to industry! Send for complete details NOW!

THE FIRST of many new U. S. OFFICE OF EDUCATION training films are now ready for your use.

These new films cover occupations approved by the War Manpower Commission as those requiring FIRST attention. The subjects are so basic that they will prove valuable to practically any industry.

To increase the effectiveness of the new program, you now have available *tested* "show how" units consisting of a sound motion picture, an instructor's manual, and a silent film strip *for each subject covered.*

Partial list of films now available is shown at left. Many other subjects are now in production. They will be ready soon. To obtain full details on these—and forthcoming subjects—send the coupon below TODAY!

Put all films that you can use to work immediately!

CASTLE FILMS INC.

Distributor for

THE UNITED STATES OFFICE OF EDUCATION

CASTLE FILMS, INC.

RCA BLDG.	FIELD BLDG.	RUSS BLDG.
NEW YORK 20	CHICAGO 3	SAN FRANCISCO 4

Address nearest office

Please put us on your mailing list to receive complete information on U. S. OFFICE OF EDUCATION worker-training films.

*Company*_____

*City*_____

*State*_____

*By*_____

A.M. 2-17

FOR PRECISION GRINDING of HARDENED STEEL PARTS

FOR MILD STEEL SURFACING

Almost daily this 846-K-1 Dayton wheel makes new friends. Not every wheel can make and support that statement.

Some find the 846-K-1 Dayton particularly effective when surfacing mild steel—maximum removal of stock with little wear on the wheel.

Others find it equally suitable for precision grinding operations—excellent finish—high production.

Still others use it, not to surface some one material only, but to process a variety of materials—high production and long wear the invariable result.

It may be that you are puzzled over some surface grinding problem. It may be that a Dayton 846-K-1 would solve that problem. Why not find out? Outline that problem by letter, wire, or phone. A Dayton 846-K-1, or some other Dayton wheel perhaps, may solve it for you.

Dayton Wheels in all types and sizes for all grinding requirements.

SIMONDS WORDEN WHITE CO.
712 NEGLEY PLACE **DAYTON, OHIO**

DAYTON
GRINDING WHEELS

ERRINGTON
STAPLETON, STATEN ISLAND, N. Y.
MULTIPLE HEADS

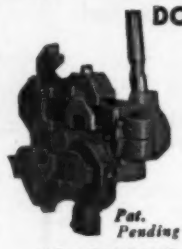
Super-Sensitive Fixed Center Multiple Drilling Heads
Fixed-Center Auto-Reverse Multiple Tapping Heads
All Parts Fully Enclosed to Insure Pressure Lubrication and Rigid Support of Adjustable Spindles
ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD

GRINDING WHEEL DRESSERS

We manufacture a complete line of Dressers and Cutters. Write for copy of catalog "A".

DESMOND-STEPHAN MFG. CO.
URBANA, OHIO
Canadian D-S Mfg. Co., Hamilton, Ont.

DON'T WAIT FOR TURRET LATHES



Convert your engine lathe into a turret lathe in 15 seconds. To fit Bench lathes and lathes up to 24" swing. Designed to increase production. 6 DAYS DELIVERY.

The 4-Tool Tool-Post Turret is made in 2 sizes. The 5-Tool Tail-Stock Turret is made in 4 sizes. Also Adjustable Pull Feed—easily attached. All tools are precision attachments. Write for further details.

4-Tool Tool-Post Turret
"Jefferson Turrets are real production tools — substantial, rigid, accurate and adaptable to any size or make of engine lathes. They must not be confused with the small makeshift gadgets now on the market."

Also — Jefferson Precision Milling Machines, Milling Machine Dividing Heads, Vises, Belt Sanders, Swing Frame Grinders, Gyratory Foundry Riddles

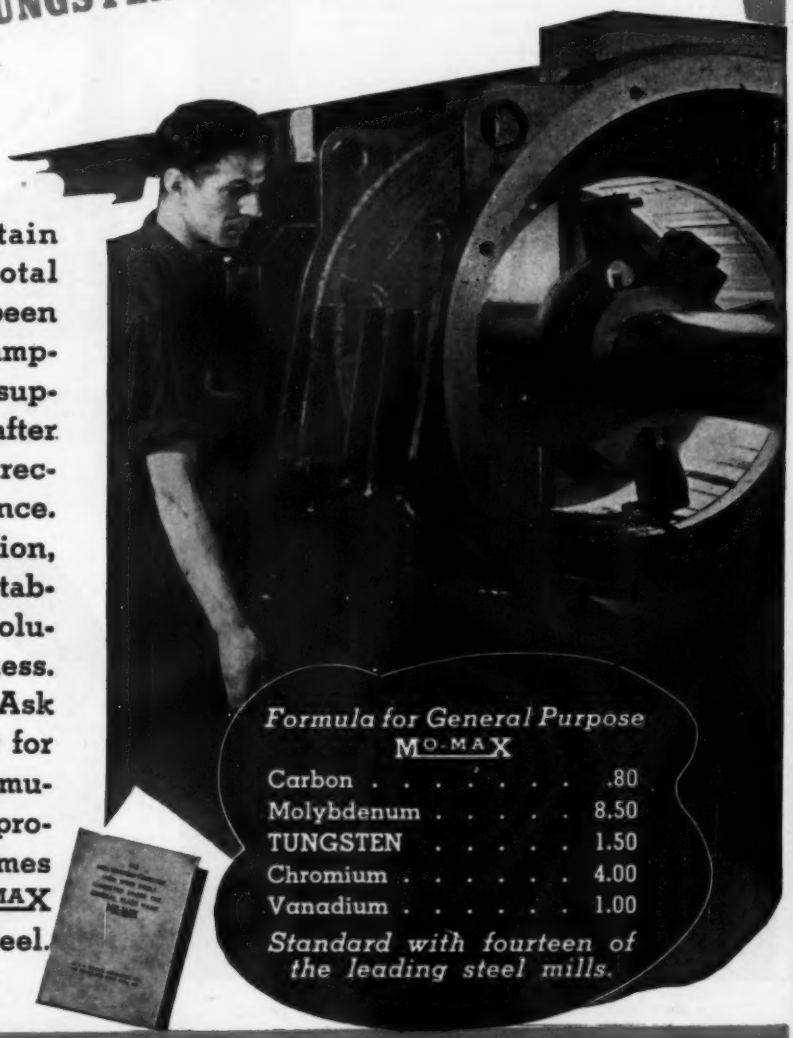
JEFFERSON MACHINE TOOL CO.
80. SWEENEY, CUTTER & FOURTH STS., CINCINNATI, OHIO

Restrictions are off

MO-MAX

TRADE MARK REG. U.S. PAT. OFF.

MOLYBDENUM-TUNGSTEN HIGH SPEED STEEL



The war-born shortages in certain materials, which restricted the total possible output of MO-MAX, have been overcome. No longer need you be hampered by inability to obtain adequate supplies of MO-MAX. Today MO-MAX, after ten years of successful use, has a record of tested and known performance.

For quality and quantity production, STANDARDIZE on thoroughly established MO-MAX, the steel that revolutionized the high speed steel business. It is available from reliable sources. Ask your nearest regular steel supplier for MO-MAX. If it is not in stock, communicate with any of the tool steel producers listed below. Their brand names shown on this page are all MO-MAX molybdenum tungsten high speed steel.

Formula for General Purpose
MO-MAX

Carbon	.80
Molybdenum	8.50
TUNGSTEN	1.50
Chromium	4.00
Vanadium	1.00

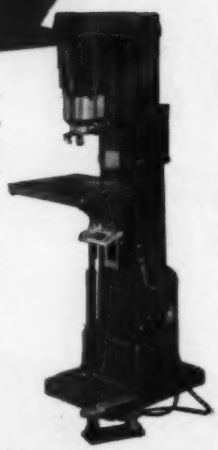
Standard with fourteen of the leading steel mills.

For technical data booklet, write any mill named or The Cleveland Twist Drill Co., Cleveland, Ohio.

THEY'RE ALL MO-MAX

"LMW"	Allegany Ludlum Steel Co.	"Molite 8"	Columbia Tool Steel Company	"Tatmo"	Latrobe Electric Steel Co.
"Mohican"	Atlas Steels, Ltd.	"Rex-T-Mo"	Crucible Steel Co. of America	"S.T.M."	Simonds Saw and Steel Co.
"Bethlehem HM"	Bethlehem Steel Company	"Di-Mol"	Henry Disston & Sons, Inc.	"Mo-Tung"	Universal-Cyclops Steel Corp.
"Mo-Cut"	Braeburn Alloy Steel Corp.	"Rex-T-Mo"	Halcomb Steel Co.	"Vul-Mo"	Vulcan Crucible Steel Co.
"Star Max"	Carpenter Steel Co.	"Mogul"	Jessop Steel Company		

THE *Right* MACHINE
THE *Right* FIXTURE



Insure continuous, trouble-free tapping production The HASKINS Way, combining Haskins AIR CONTROL with the right fixture. Add Piece Part Control and you approach completely automatic tapping. Placing the part in the fixture actuates a micro-switch—AIR does the rest. Each piece is tapped uniformly, precisely—faster than by any other method. For complete information on high speed tapping The Haskins Way, send for our latest catalog. R. G. Haskins Co., 2761 W. Flournoy St., Chicago, Ill.

HASKINS

haskins

PRECISION TAPPING EQUIPMENT

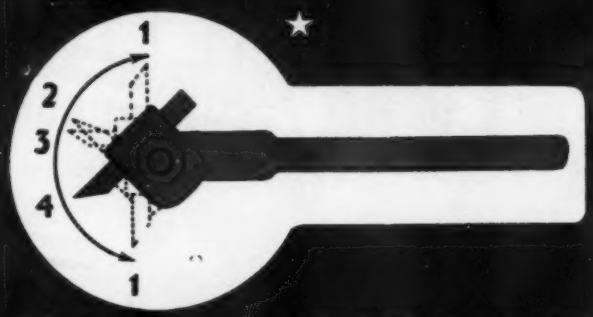
AMERICAN
TOOL HOLDERS

★

Here is a really fine tool room tool holder that soon pays for itself because of advanced design details.

Each holder holds three sizes of bits—each bit may be held in four positions—the holder grips the tool with a wide, immovable grip. Write today for descriptive folder.

★



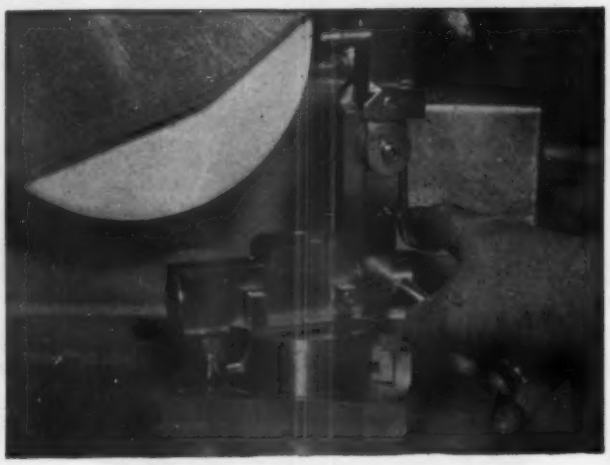
EDWARD BLAKE COMPANY

634 COMMONWEALTH AVE., NEWTON CENTRE, MASS.

BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS — L & D HIGH SPEED DRILL PRESSES

A RADII & ANGLE DRESSER

OF PRECISION AND VERSATILITY



An instrument of precision and versatility . . . Operation is simple requiring no high degree of skill for accuracy . . . Any one of the following can be produced with one setting:

One angle	Two angles and radius.
Two angles	Many other diversified forms to meet requirements.
Concave radii up to 8"	
Convex radii up to 4½"	

Wheel size capacity—14" dia.; angular travel 3"; for use on universal surface and cylindrical grinders.

Full details available on request.

MANUFACTURED BY

J. & S. TOOL CO. 477 MAIN ST. EAST ORANGE, N. J.

PRECISION DRESSING TOOLS

TODAY – SPEEDING WAR PRODUCTION
TOMORROW - BEATING COMPETITION

OUR NEW IMPROVED
STANDARD No. 658
TURRET HEAD
Applied to tailstock, a sliding bed. Making a completed turret application of this type.

5 TOOLS IN POSITION *for* INSTANT CHANGE

ALLOWING MINUTE ADJUSTMENTS WITH

10 ACCURATE TOOL POSITIONS

Many machine shops in the United States and Canada ordered Our New Improved Turret Heads, to speed up War Production — today. When the War is over — COMPETITION once more becomes the — DICTATOR of tomorrow. So, it is a *MUST* — in your modern retooled shop to have many of Our New Improved Turret Heads, to meet that keen COMPETITION — tomorrow.

MADE UP IN FOUR SIZES
9" to 30" SWING

SEND FOR COMPLETE FOLDER OF DETAILS

AUTOMATIC MACHINE & TOOL CO.
ENGINEERED PRODUCTS
AUBURNDALE, MASSACHUSETTS

132 CHARLES STREET, AUBURNDALE, MASS.

Are you tapping these proven sources of greater production efficiency?

GULF CUTTING OILS | **GULF SUPER-QUENCH**

Let a Gulf Service Engineer show you how these outstanding Gulf products can help you increase output and reduce costs

Here's why Gulf Cutting Oils and Gulf Super-Quench should have a prominent place in your plans for increased production:

A long list of metal parts for the nation's war machine—some of them probably similar to parts you are making — are being produced faster, better, and at lower cost with these superior cutting and quenching oils!

In many cases, Gulf Cutting Oils and Gulf Super-Quench have revolutionized existing concepts of cutting and quenching oil performance — resulting directly in outstanding improvements in production, tool life, finishes, and physical properties.

Investigate—call in a Gulf Service Engineer today and let him show you how Gulf Cutting Oils and Gulf Super-Quench can help you improve machining and quenching practice. Or write for your copy of each of these booklets: "Gulf Cutting Oils" and "Gulf Super-Quench."

GULF INDUSTRIAL LUBRICATION

Lubricants for every industry

GULF OIL CORPORATION
GULF REFINING COMPANY
GULF BUILDING, PITTSBURGH, PA.

CUTTING FLUIDS DESERVE YOUR SERIOUS ATTENTION

Well informed authorities have made the statement that more intelligent application of cutting fluids and better tool grinding would make possible a 30% increase in metal-working production. In these days of man-power shortage, what a challenge that statement presents!

Be honest . . . in your plant are cutting fluid problems given the attention they deserve? Are your performance records accurate? Are you aware of what better cutting fluids can do for the job? Or is your attention centered on other fields until real trouble developes which might be traceable to improper use of cutting fluids? Hundreds of metal-workings plants are getting the most out of their cutting fluids by working closely with the Stuart service engineer. They know that there is no universal cutting fluid, no magic compound—but when a Stuart product is put on the job they are sure they have every cutting fluid advantage that broad engineering experience and "know how" can give them.

To be sure you have all the advantages, work with the Stuart service engineer, representing a company which has specialized in metal-working lubrication since 1865.

A REQUEST OF STUART CUSTOMERS
1. Do not drop.
2. Use a little oil to avoid stripping threads in removing plugs.
3. Replace plugs carefully when drum is empty.
4. Keep drums under cover when emptied.

We invite you to write for our new free booklet, "The 577th Oil," which contains twenty-two case histories, typical examples of how Stuart engineering is solving production problems, (like your own), as well as other valuable metal-working data. State your name, company and title.

1 MOTOR TOOL LIVE CENTER

WILL *Outlast* A BASKETFUL OF *Ordinary Centers*

The record established by MOTOR TOOL Live CENTERS over the past two years of strenuous war production has been *remarkable* . . .

Remarkable — because of the absence of burn-outs and breakdowns in month after month *continuous* high speed operation . . .

Remarkable—because of the savings effected.

BUY UNITED STATES WAR SAVINGS BONDS STAMPS

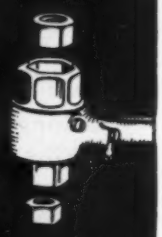
MOTOR TOOL MANUFACTURING CO.
METAL CUTTING TOOLS
7767 CORTLAND AVENUE · DETROIT, MICHIGAN

Make it a Rule to Call Motor Tool

TIME SAVER

The only wrench with all these features . . . instantly reversible ratchet . . . heads that fit two different size nuts . . . fits in narrow spaces . . . can be used over long studs. Try it! See why users report 75% faster nut tightening. Three handle sizes . . . each handle takes five different heads. Carried by leading supply houses.

GREENE, TWEED & CO.
Bronx Blvd. at 238th St., New York



FAVORITE *Reversible Ratchet* WRENCH

2 things

shopmen tell us about Bethlehem Carbon Tool Steels

Right through the war emergency shopmen have been turning in enthusiastic reports about the service they're getting from Bethlehem Carbon Tool Steels. They praise these steels chiefly on two counts:

We've had a lot of shopmen tell us this, by letter and by word of mouth. We'd rather have a good word about tool steel from a shopman than from anybody else, for he's the man who *knows.* He's working with the steel every hour of every day. When he says tool steel is good, *it's good.*

If work in your shop requires carbon tool steel, try Bethlehem Carbon Tool Steels. We think you'll like them.

BUY MORE WAR BONDS

★ BETHLEHEM STEEL ★

CHASO Threading Tools

IT'S Chaso FOR CHASERS!

We make chasers for most of the well-known makes of self-opening die-heads.

CHASO TOOL COMPANY, Inc. *Royal Oak, Michigan*

Kill Corrosion

ASK FOR FOLDER AM
"The Touch of Death to Steel"

With complete emphasis on maintaining exact precisions, Angier has compiled from government and industrial sources a recommended wrapping method using INDUWRAP® — the inhibitive dual wrapper — a sure life saver to vital steel parts. INDUWRAP is the proven corrosion preventive.

"Corrosion — The Touch of Death to Steel" is a folder which tells you how to prevent corrosion entirely and how to protect polished precision parts by the use of Angier INDUWRAP. The engineered inhibitive construction of this new wrapper points the way to better peacetime packaging.

® Registered U. S. Patent Office

Ask for free folder and literature describing Angier Corrosion Preventive A-19 Wrappers and join the battle against corrosion.

Angier

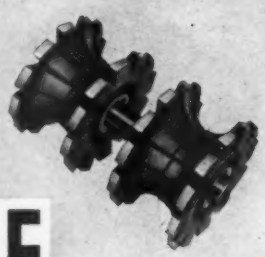
ANGIER CORPORATION

CORROSION PREVENTIVE AND WATERPROOF PAPERS

FRAMINGHAM, MASSACHUSETTS

MORE CUTS PER DOLLAR

from Specials



ALL TYPES AND SIZES— FROM A TINY REAMER GROUND FROM THE SOLID TO A MASSIVE GANG OF MILLING CUTTERS. SEND YOUR PRINTS TO **A.C.E.**

HEADQUARTERS FOR SPECIAL CUTTING TOOLS

We have modern machinery and equipment, modern methods, trained operators and the "Know How" to turn out special cutting tools that meet your requirements in accuracy, precision and workmanship. Send us your immediate needs for prompt inquiries. Bulletin on request.

AMERICAN CUTTER & ENGINEERING CORP., 31745 MOUND ROAD, WARREN, MICH.

AMERICAN CUTTER

AND ENGINEERING CORP., WARREN, MICH.

SPECIALIZING IN HIGH SPEED CUTTING TOOLS TO YOUR PRINTS

THEY FLEW FOR 2 MINUTES . . .

Boeing 314 Clipper (Pan-American)

TODAY . . . *We Span the Oceans*

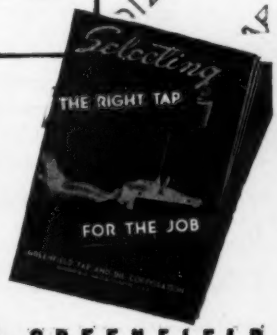
The contrast in performance between now and the first days of airplanes is one way of looking at their amazing progress. But it's *not* the most vital difference. The real difference between today and 1903 is that today we can build 8000 planes a month.

What has brought about this progress? Mass production? The assembly line? Yes, but before these were possible, there had to come STANDARDIZATION — the adoption of standard interchangeable parts which would assemble instantly without "hand fitting." This basic feat with its attending economies has made available to many, in all fields, products that were formerly available only to a few.

The use of *standard Screw Thread forms and sizes* has contributed enormously to this simplification of manufacture. A more universal adoption of these standards can carry their benefits still further in the years immediately ahead.

Standard Threads- SAVE TIME - SAVE MONEY!

Full utilization of existing accepted sizes, pitches and forms can bring lowered costs to all manufactured products because: (1) it speeds production; (2) it reduces inventory. NOW, when plans for new and better products are taking shape —now is the time for a united effort to bring about greater standardization of threaded parts



Send for booklet "Selecting the Right Tap for the Job"—18 pages of Facts, Tables, Suggestions

GREENFIELD TAP AND DIE CORPORATION GREENFIELD MASSACHUSETTS

QUESTION: WHY DOES PAINT CHIP AND PEEL FROM "HOT" GALVANIZING?

ANSWER:

Galvanized and Zinc-plated surfaces require paint for lasting protection, since in most instances the protective value of galvanizing or zinc-plating is not sufficient to insure preservation.

Paint will not adhere to "hot" or untreated zinc-coated or galvanized materials because of surface characteristics and alkalinity. Without proper "cooling" and preparation for paint, chipping and peeling result, thus destroying the whole purpose of painting—metal protection.

REDI-PAINT passivates these surfaces. It effects the necessary chemical change by neutralizing alkalinity, roughening surface slightly for an anchor point for paint, making the metal resistant to corrosion, forming an inert film which will not become alkaline.

REDI-PAINT speeds production by its easy application, by hand or by tank immersion. It eliminates unnecessary backtracking because of its easily distinguishable dark color, while rapid drying permits quicker handling for further processing.

★

Call the Turco Technical Service Man in your vicinity or fill in the blank below for further information regarding TURCO REDI-PAINT.

TURCO PRODUCTS, INC. **BUY WAR BONDS**
6135 SO. CENTRAL, LOS ANGELES 1

Please send free booklet on REDI-PAINT

*Name*_____ *Firm*_____

*Title*_____

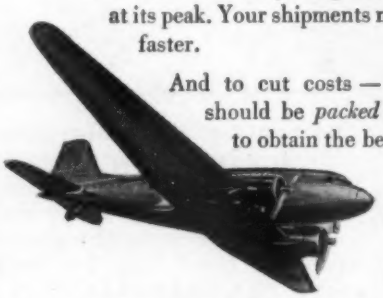
*Address*_____

ON YOUR LETTERHEAD, PLEASE AM-2

SHIPMENT READY? REACH FOR THE PHONE!

WHEN your AIR EXPRESS shipments are ready, reach for the phone. Don't wait for "routine" afternoon pick-ups. Pack as early in the day as possible and SHIP WHEN READY! That's the way to get the full benefit from Air Express service. It avoids end-of-the-day congestion when Airline traffic is at its peak. Your shipments move faster, are delivered faster.

And to cut costs — AIR EXPRESS shipments should be *packed compactly* but securely, to obtain the best ratio of size to weight.



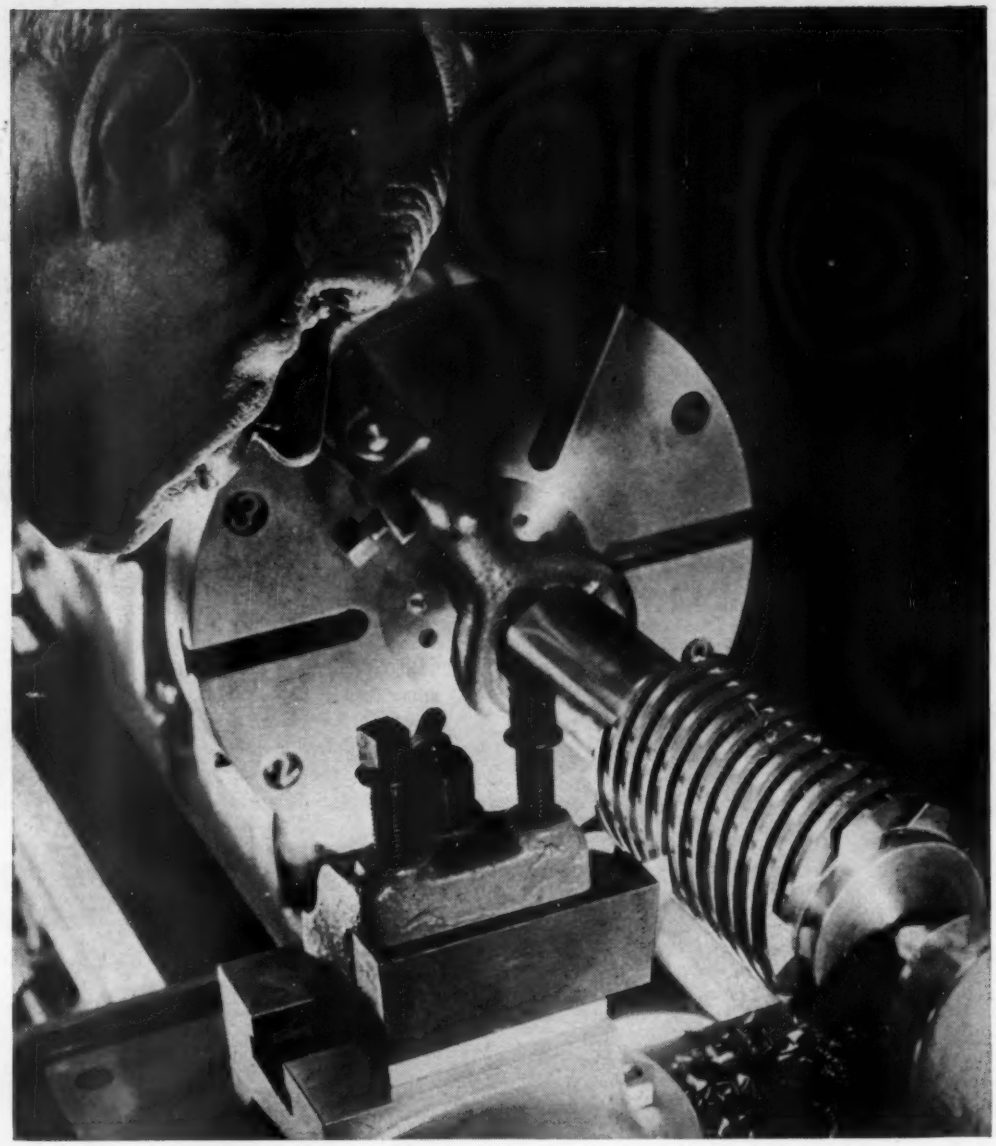
A Money-Saving, High-Speed Tool For Every Business

As a result of increased efficiency developed to meet wartime demands, rates have recently been reduced. Shippers nationwide are now saving an average of more than 10% on Air Express charges. And Air Express schedules are based on "hours", not days and weeks—with 3-mile-a-minute service direct to hundreds of U.S. cities and scores of foreign countries.

WRITE TODAY for "Vision Unlimited"—an informative booklet that will stimulate the thinking of every executive. Dept. PR-2, Railway Express Agency, 230 Park Ave., New York 17, N. Y.

AIR EXPRESS *Gets there FIRST*

Phone RAILWAY EXPRESS AGENCY, AIR EXPRESS DIVISION
Representing the AIRLINES of the United States



For fine tool work...buy a

HENDEY

A multiple-start screw being finished in a Hendey tool room lathe equipped with precision lead-screw, a Hendey sub-headstock, and with spindle collar at rear end graduated for accuracy of spindle indexing.

The sub-headstock gives the needed slow work speeds (one turn to six of the spindle) required to handle coarse pitch screw cutting involved in the example shown. The precision lead screw protects the accuracy of the screw being cut. The graduations on spindle collar or the milled slots in the driving plate furnish simple and effective means of securing the multiple starts in the screw being finished.

For tool work Hendey Lathes are very important.

THE HENDEY MACHINE COMPANY

TORRINGTON, CONN., U. S. A.

BOSTON • NEW YORK • ROCHESTER • DETROIT • CHICAGO

NOW more than ever you need this help for TRAINING Tool and Die Makers

OVER 49,000 COPIES IN USE

Read What Others Say:

...Consider it one of the very finest books that our local schools of vocational and adult education might use in training of apprentices in machine trades.
R. L. Welch
Supervisor Industrial Education
State of Wisconsin

...Valuable textbook for apprentices and journeymen, and an equally valuable handbook for tool designers and others concerned with the use of tool steel.
J. B. Chalmers
Director of Training
The Yale & Towne Mfg. Co.

Widely used by many companies and trade schools throughout the U. S., it meets urgent need for a complete, up-to-date text for training new men, "refreshing" older men, or trouble-shooting in the tool room. The shortage of tool and die makers must be met fast by men who know the "whys" and "hows." This book gives them both and more. It shows how to select tool steel; how to make tools; how to avoid trouble; how to improve tool performance.

TOOL STEEL SIMPLIFIED

By FRANK R. PALMER
Vice-President of
The Carpenter Steel Company

315 pages — 205 illustrations

$1.00 postpaid in U. S. A. **Elsewhere $3.50**

Low price of $1.00 per copy makes it economical for training use. Elementary enough to meet the urgent need for a good text for apprentice training. Practical enough to be helpful in advancing the skilled tool maker. Contains hundreds of practical suggestions that can be quickly applied in daily work to get improved tool performance. Send coupon below for a copy of "Tool Steel Simplified."

SEND Now

The Carpenter Steel Company, Reading, Pa. Dept. No.-1-Q

Please send me postpaid your convenient handbook, "Tool Steel Simplified". I enclose $1.00 ($3.50 outside the U. S. A.) in full payment.

NAME _____ TITLE _____

FIRM NAME _____
(Firm name must be given)

MAILING ADDRESS _____

CITY _____ STATE _____

Accelerating WAR PRODUCTION

Speed your output with Criterion Diamond Tools. The kind of service they give is responsible for the swift, steady increase in their use. Quality of diamonds employed plus a unique method of setting assure extreme rigidity and extra tool life. Special tools made to order following blueprints or specifications. Sharp-pointed, selected thread grinding tools. Ask your dealer or order direct. Request free literature.

CRITERION MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

NO WIRES—NO HEATING—NO OPERATING COSTS

Permanent Magnet Type Chucks are ready for instant use and on any machine of suitable size—no electrical connections of any kind are needed—chucks have strong holding power. Send for complete catalog.

†BROWN & SHARPE MFG. CO.
Providence, R. I., U. S. A.

RECTANGULAR MODELS
5" x 10"
6" x 18"
8" x 24"
12" x 36"
ROTARY MODEL
9" Diam.

DELIVERIES ARE GOOD ON SOME SIZES
For sale only in the U. S. A. and its Territories and Canada

BROWN & SHARPE
MAGNETIC CHUCKS
PERMANENT MAGNET TYPE

★ ★ ★ ★ ★ ★

METAL CUTTING INDUSTRY HAILS TANTUNG

Miracle Metal Establishes New and Amazing Records

TANTUNG
New Non-Ferrous Cast Alloy Replaces High-Speed Steel Tools — is Proving to be of Tremendous Advantage to the Metal Cutting Industry.

Tantung is the trade-name of the most advanced non-ferrous cast alloy for metal cutting. It was developed to "Fill The Gap" between conventional High-Speed Steel Tools and Cemented Carbides—a long-felt need in the metal cutting field. Scientists of the Fansteel Metallurgical Corporation, an affiliate of the Vascoloy-Ramet Corporation, spent years of research and experiment in perfecting Tantung. Performance records developed under all shop conditions establish Tantung as the most outstanding contribution to the metal cutting industry since the advent of Cemented Carbides.

CUTS ANY METAL THAT CAN BE MACHINED

More than a million Tantung tools have been used by the trade for practically all machining operations. Tantung cuts rolled, forged or cast steel, annealed or heat treated, cast iron, aluminum, brass, copper, bronze or any material that can be machined.

Tantung has an exceptionally high transverse rupture strength. It is tough and shock resistant. Hardness, to be a practical gauge of wear resistance, must be measured at working temperature. It is the high red hardness of Tantung, higher than any high-speed steel, that enables it to work so efficiently under heavier loads. This virtue, coupled with Tantung's peculiarly low coefficient of friction, contributes to the remarkably long life between grinds. Tantung far surpasses all performance records of high-speed steel for pieces produced per grind.

Tantung can be operated at far greater speeds than are recommended for high-speed steel. Tantung permits heavier cuts and heavier feeds. It is an excellent finishing tool and on most materials the finishing cut can be taken at at least one speed faster than the roughing cut.

TANTUNG IS SELF-LUBRICATING

Tantung's basic formula includes tantalum carbide. Tantalum carbide not only imparts a self-lubricating action to Tantung tools, but in combination with other materials makes possible the dense structure that is responsible for the keen, durable cutting edge. "Cratering" or "chip wear" is reduced to a minimum.

NO SPECIAL TRAINING OF OPERATORS REQUIRED

Standard Tantung tools fit all standard tool posts and holders, and personnel trained to high-speed tool practices can readily employ the same techniques to produce vastly superior results with Tantung tools.

(To insure efficient cutting under various speeds and with different tools, we furnish Wall Charts and Pocket charts to guide the workman in proper tool selection. These are furnished free upon request regardless of whether our tools are used.)

HOW TANTUNG "FILLS THE GAP"

Tantung is not recommended as a substitute for Cemented Carbide tools; it should be specified where Cemented Carbides cannot be used effectively. In the jobbing shop, maintenance departments, and smaller production shops where a great variety of work is handled, the versatility of Tantung recommends its use from the point of tool economy. Bronze, cast iron, aluminum, plastics and steels can all be machined by the same tools with actual cutting time substantially reduced.

HOW TO USE OLD MACHINES TO MAXIMUM CAPACITY

Old machines very often do not have sufficient speed for Carbide and, in combination with vibration and worn gears, Carbides cannot be used effectively. Tantung enables these machines to be used to capacity. This is especially true with small diameter work. Often-times Tantung and carbide-Tantung for the small diameter and Carbide for the large diameter—are teamed together in the same operation with excellent results.

HEAT TREATED ALLOYS MACHINED WITHOUT DIFFICULTY

The ever increasing use of heat treated alloys ordinarily presents machining difficulties that Tantung successfully overcomes. Machining these alloys requires sharp side and top rake angles that cause chipping of the Cemented Carbide tools. The greater toughness of Tantung supports the cutting edge at these angles and the tantalum carbide content aids the sliding of the chip causing less chip pressure.

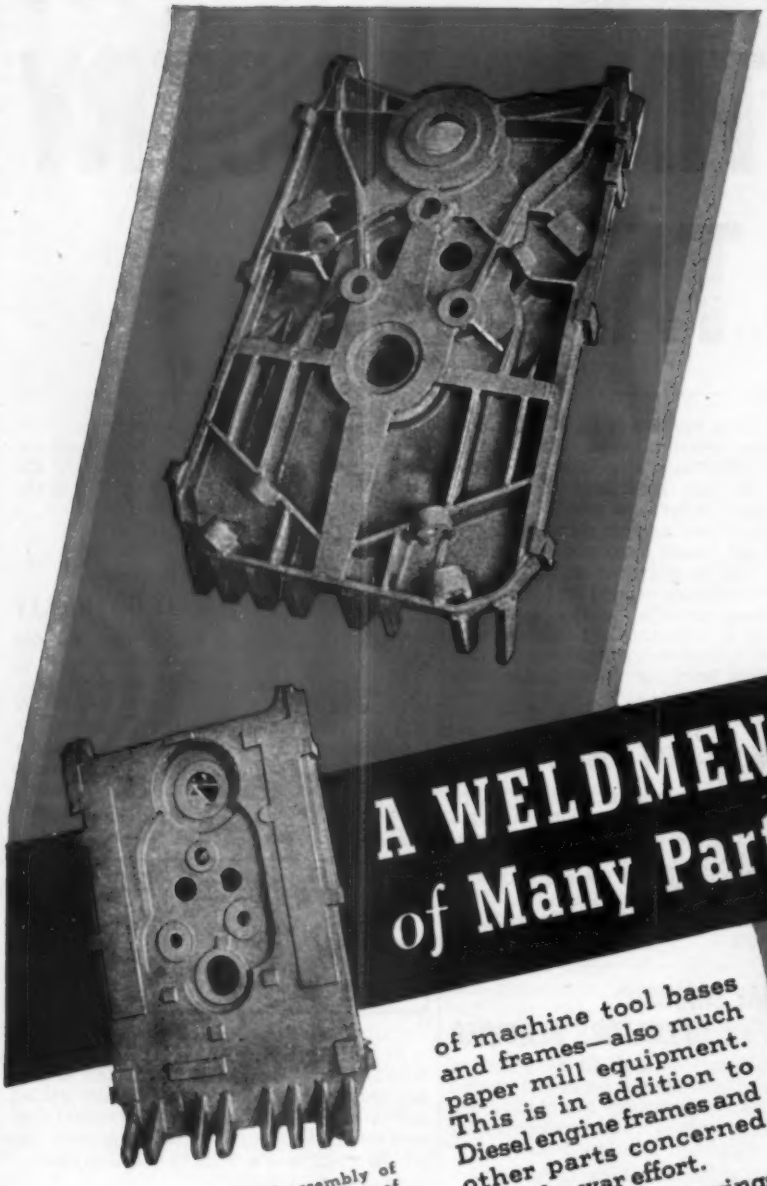
COMPARATIVE PERFORMANCES OF TANTUNG TOOLS AND HIGH-SPEED STEEL TOOLS

MACHINERY MANUFACTURER REPORTS: "Using a 20-year old boring machine on 18-8 stainless steel with welded joints, High-Speed Steel and Carbides failed miserably. Tantung tool bit completed the job in three hours with mirror-like finish."

A PUMP MANUFACTURER ADVISES: "Tantung is truly the Miracle Metal In machining Navy Bronze on a Kearney & Trecker milling machine, Tantung cutter performed a miracle. Tantung produced 26,250 pieces per grind against 3750 for high-speed steel cutter."

A LARGE FORGE COMPANY WRITES: "Ran Tantung at double the speed used for high-speed steel. Tantung produced four times the amount of cutting as against high-speed steel operation—machining scaly, nickel, chrome forging, Brinell 321; on a 42" axle lathe."

Tantung tools operate efficiently at speeds not possible with high-speed steel tools. On an average, speeds and feeds can be increased 50% to 200% over high-speed steel according to variables occuring in materials and machines. More detailed performance data, more specific information regarding Tantung "The Miracle Metal" is interestingly graphed and illustrated in the new Tantung catalog. For copies of Catalog, Wall Charts, Pocket Charts, address: Vascoloy-Ramet Corporation, North Chicago, Illinois. 4442



A WELDMENT of Many Parts

This crane deck is a grand assembly of around fifteen sub-assemblies made up of a great many parts. Steel plates—2¼", 1¼", ⅛", ¼", ⅜" and ½"—employed. Total weight, 2,130 lbs.

Here is a weldment that called for a high measure of engineering skill and welding "know-how."

United Welding Company also fabricates an unusual number of machine tool bases and frames—also much paper mill equipment. This is in addition to Diesel engine frames and other parts concerned with the war effort.

Submit your drawings for study and quotation. Engineering advice or service available upon request.

If it can be welded, let us weld it—to increase its strength, lighten the weight and improve its appearance—as well as speed its delivery.

WELDING ENGINEERS · MIDDLETOWN, OHIO · UWCO

THE UNITED WELDING CO.
MIDDLETOWN, OHIO
WELDING FABRICATORS OF MODERN DESIGNS

ARMY E NAVY

National CLASSIFIED ADVERTISING

for bringing business needs or opportunities to the attention of other men associated in executive management, sales and responsible technical, engineering and operating capacities with the industries served by . . .

The SEARCHLIGHT SECTIONS

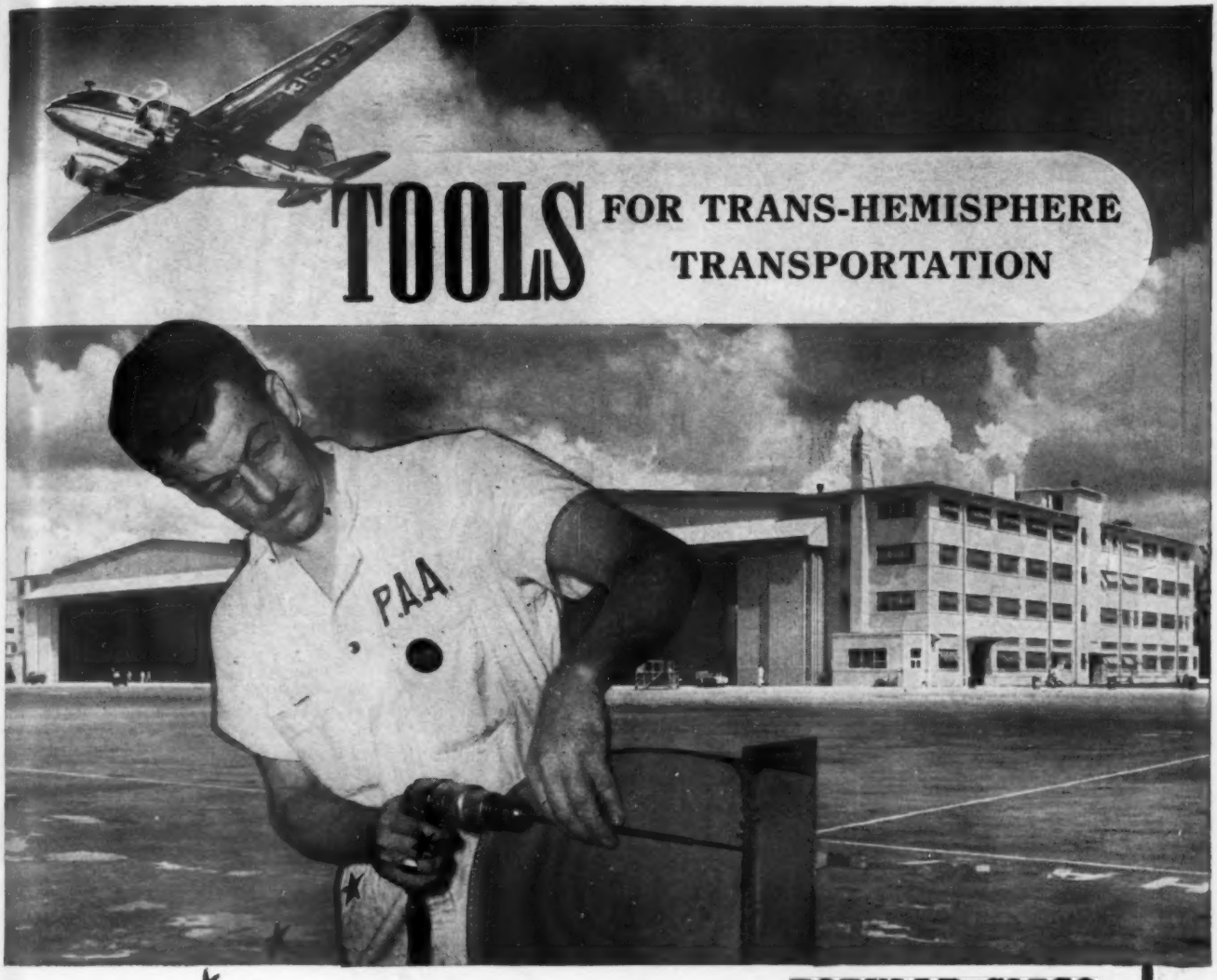
Classified Advertising of these McGraw-Hill publications

Air Transport
American Machinist
Aviation
Aviation News
Business Week
Bus Transportation
Chemical & Met. Engineering
Coal Age
Construction Methods
Electrical Contracting
Electrical Merchandising
Electrical World
Electronics
Engineering & Mining Journal
Engineering News-Record
E. & M. J. Markets
Factory Management & Maint.
Food Industries
Power
Product Engineering
Textile World

For advertising rates or other information, write:

Departmental Staff

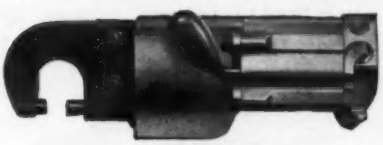
McGRAW-HILL PUBLISHING CO., INC.
330 W. 42nd Street
New York 18, N. Y.



Because their routes are globe-shrinking in scope, Pan American World Airways must service their planes with the finest equipment. That is why Cleco Aircraft Tools are used extensively in Pan American maintenance work. Illustrated is a Cleco No. 123 Drill used at their huge new hangar at Miami.

Cleco tools for aircraft maintenance and production include literally hundreds of styles of drills, riveters, squeezers, screw drivers, nut setters, etc. We make Cleco Type "P" Sheetholders which are *triple-safe*—non-flying. Also immensely popular is the Cleco RIV-N-JECTOR—a rivet-holding magazine that reduces rivet dropping 90%. *Bulletin 85, enlarged and revised, describing all these products in detail, sent immediately upon request.*

POPULAR CLECO AIRCRAFT TOOLS



41C Squeezer

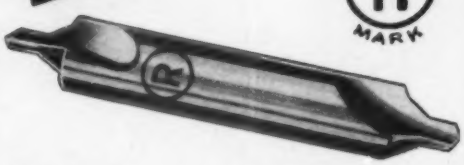
Riveter with BW Handle

9DP10 Drill

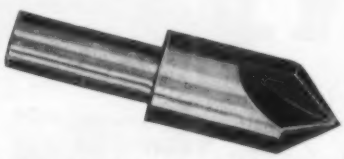
COUNTERSINKING CRANKSHAFTS

CIRCLE-R COMBINATION CENTER DRILLS WERE *"Made to Order"* For This Operation

TRADE R MARK



These drills are coping with one of the toughest crankshaft production jobs in the automotive industry. In this capacity a smaller size combined drill and countersink is used for spotting, followed up with a larger size drill.



CIRCLE-R CENTER REAMERS are helping to boost production in the airplane industry where they are used for countersinking of rivet holes. Circular Tool furnishes the majority of reamers used for this purpose.

Send today for Circular Catalog — K

CIRCULAR TOOL CO., INC.
PROVIDENCE 5, R. I.

LOS ANGELES · ROCHESTER · INDIANAPOLIS · DETROIT
CHICAGO · PHILADELPHIA · NEW YORK · DAYTON
CLEVELAND · ST. LOUIS

WHEN COLLET WORK IS INDICATED - SPECIFY

Precision Collets

IMMEDIATE DELIVERY FROM STOCK

GUARANTEED UNCONDITIONALLY, AND AVAILABLE IN THE WANTED MODELS FOR MOST IMPORTANT LATHES INCLUDING SOUTH BEND, ATLAS, LOGAN, SHELDON, ETC.

MODEL 3AT for 10" Atlas, Logan, 12" Craftsman, No. 700 Powr-Kraft • MODEL 3C for 8 & 9" South Bend, 12" Clausing, Hardinge No. 3, 10" LeBlond, etc. • MODEL 1A for 8 & 9" South Bend • MODEL 5C for 9", 10", 16", 18" South Bend. Also Sheldon, Schauer, Sebastian 1" Capacity, etc. • MODEL 4C for 14½" South Bend. Also Sheldon, Hardinge No. 4, Elgin ¾" Capacity, etc. • MODEL 480 for Logan Screw Machine, Turret Lathe and attachments. Also Warner & Swasey No. 1, etc.

• Order from your dealer or write us for literature.

GENERAL DIE-STAMPING-TOOL COMPANY
PRECISION COLLET DIVISION 265 Canal Street, New York 13, N.Y.

Grips 'em tight

For firmly gripping drills, keyway cutters and end mills, you can't beat Universal Collet Chucks. Universal Chucks don't marr tool shanks yet grip as strong as solid steel itself. The chuck shown here has National Milling Machine taper shank. Also available are Universal Standard, Floating, and Centering chucks. Write Universal today for complete facts.

UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN

THE ABRASIVE DEVELOPMENT of a DECADE!

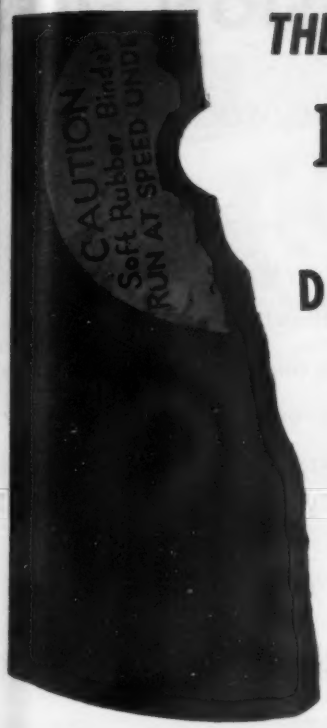
"RUBBER CUSHIONED"

Brightboy

ABRASIVE—UNIFORM THROUGHOUT

GIVES FASTER, BETTER

DE-BURRING, FINISHING, POLISHING



THIS BRIGHTBOY WHEEL was purposely split to show the even impregnation of the abrasive clear through its resilient rubber binder.

3 TEXTURES

Brightboy
STANDARD

Brightboy STANDARD texture is a favorite for deburring, finishing and polishing on the widest variety of metals and metal parts.

Brightboy
FINE-TEX

Smoother, finer texture for work on softer metals, producing special finishes and for applications where the coarser wheel might not be suitable.

Brightboy
TUFF-TEX

Tougher texture, for finishing hard metals. The tougher binder accents the abrasive action, yet retains the soft rubber cushion, finishing and polishing in one operation.

BRIGHTBOY'S RUBBER AND ABRASIVE COMBINATION, plus the way it works, contributes a remarkable finishing action which frequently serves as the final polish. In operation, the abrasive recedes slightly into the rubber binder, the abrasive and the rubber joining in a combination finishing and polishing job.

Brightboy is now saving countless hours and operations in leading American industries — and can achieve outstanding results for you. Made in wheels, and in rods and blocks for manual work. Ask your distributor for prices and for "Methods and Applications" booklet. Brightboy field representatives are at your service. Investigate Brightboy now.

BRIGHTBOY INDUSTRIAL DIVISION
Weldon Roberts Rubber Co. **Newark, N. J.**

WELDON ROBERTS
Brightboy
REG U.S. PAT. OFF.

HAND-FINISHING *requires* PRECISION FILES

for machine tools, guns, planes, tanks, ships

For more than 40 years, "American Swiss" Swiss-Pattern Files have consistently maintained a reputation for uniform hardness, clean sharp teeth, and long wear. For better, faster filing insist on "American Swiss" . . . 3,000 different sizes and patterns. Buy from our Distributor.

A Precision File for every requirement

AMERICAN SWISS FILE & TOOL CO. • ELIZABETH, NEW JERSEY

American Swiss SWISS-PATTERN FILES

SPECIFY Precision LATHE ATTACHMENTS

IMMEDIATE DELIVERY FROM STOCK

For 10" Atlas & Logan, 9" South Bend ½" Capacity Lathes, etc.

Order from your dealer or write us for literature.

SpeediChuk WITH THE Precision BREN COLLET

- Increases ½" collet capacity lathes to ¾".
- Ready for instant use and interchangeable on any 1½" x 8 thread spindle lathe . . . Atlas, Logan, 9" South Bend, Clausing, etc.
- Full Spindle Accuracy.
- LEVER TYPE for continuous production. Feather pressure releases work while lathe is running. LIST $79.50, Collet extra.
- HAND TYPE for use where quantity production is not required. Lathe must be stopped to open and close collet. LIST $19.75, Collet extra.

GENERAL DIE-STAMPING-TOOL COMPANY

PRECISION COLLET DIVISION 283 Canal Street, New York 13, N.Y.

The Tubular MICROMETER

FEATHER TOUCH

Most Modern • Light Weight • Perfect Balance • Hollow Steel Frame • Triple Plated Chrome Finish

Prompt Delivery. Made in 89 Different Sizes and Types. 1" to 96".

TUMICO

Engineered To Perfection
A New Standard of Accuracy

TUBULAR MICROMETER CO.

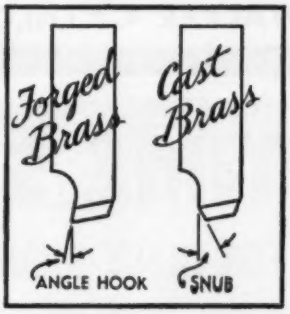
St. James, Minnesota

KINKS FROM GEOMETRIC

ON HOW TO SAVE HIGH SPEED STEEL ...AND GET BETTER THREADING!

don't use the wrong cutting face grind for the job at hand, or buy chasers from which metal has to be ground in order to secure the correct rake angle.

do specify and use the face grind best suited to the job. For example: Forged Brass requires Angle Hook, but Cast Brass needs Snub grind, with stronger cutting edge.*



The Geometric Tool Company is listed on the Treasury Department's Roll of Honor of those companies whose employees contribute at least 10% of their earnings, through the Payroll Savings Plan, for War Bonds. Buy War Bonds and Stamps each payday!

★Remember—different materials require different face grinds. Use the correct rake angle, get better threading, save precious high speed steel! Here are proper rake angles for some of the more common metals: Cast Brass requires snub or negative rake. Forged Brass, same angle hook as for steel. Copper, radial hook or radial lip hook. Cast Bronze, straight grind. Free cutting steels, slight angle hook. For tougher alloy steels, stainless steels, steel forgings, stampings, hook must be increased according to analysis of material. The manufacturer of your chasers will help you determine the correct face grind for each type of work. THE GEOMETRIC TOOL COMPANY, NEW HAVEN 15, CONNECTICUT.

GEOMETRIC

SELF-OPENING DIE HEADS
COLLAPSING TAPS
CHASER GRINDING MACHINES
SOLID ADJUSTABLE DIE HEADS
SOLID ADJUSTABLE TAPS
THREADING MACHINES

Select your magnetic chucks . . . from the

COMPLETE WALKER LINE

Universal Swivelling Magnetic Chuck for Tool Room

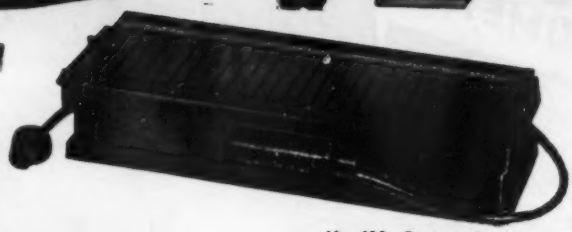
Standard units for practically any service requirement are available from Walker because of the completeness and diversity of the Walker line.

Recognized everywhere for their efficiency and economy in holding work on a wide variety of operations. Walker Magnetic Chucks will help you speed up and cut costs of grinding, milling planing and turning. If you require special designs, Walker can furnish them.

When you come to Walker, you come to specialists having more than thirty-five years experience in the development, design and manufacture of high quality, magnetic chucks of proved performance.

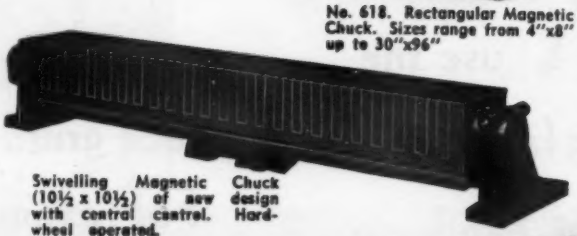
Walker offers a complete range of sizes in Rectangular, Swivelling, Vertical Faces and Rotary types.

Our illustrated bulletin W4 contains valuable information for user of magnetic chucks. Write today. Ask Walker engineers to help you select the chuck you need for your specific service.



No. 618. Rectangular Magnetic Chuck. Sizes range from 4"x8" up to 30"x96"

Style D Face Plate. "Concentric Gap" Type



Swivelling Magnetic Chuck (10½ x 10½) of new design with central control. Hand-wheel operated.

Have you the WALKER CATALOG

O. S. WALKER COMPANY INC.

WORCESTER, MASS.

TIME SAVER

FOR QUICK CHANGE MARKING

- Fastest, simplest way to number parts.
- Easy—turn screw to change numbers.
- Made of best quality tool steel.
- Guaranteed for years of service.
- PROMPT DELIVERIES

STOCK TYPE

1.... BA 1864249

2.... BA186429

3.... BA 1864

WITH HANDY TYPE BOX

SOSSNER

161 Grand St. New York 13, N. Y.

NICHOLSON EXPANDING MANDRELS

Give You Accurate High-Speed Production

Save Time! ★ ★ Improve Shop Efficiency!

Equip your shop with these economy tools for holding work while being machined. Hardened tool steel-precision ground.

Two Types—All Sizes

Sold Singly or in Sets

Bulletin No. 10-43

W. H. NICHOLSON & CO.

114 OREGON ST., WILKES-BARRE, PA.

Other Products: Arbor Presses—Control Valves—Steam Traps—Etc.

TORNADO Electric Writing Tool. Writes fast as fingers can move.

—as easy to use as a pencil—

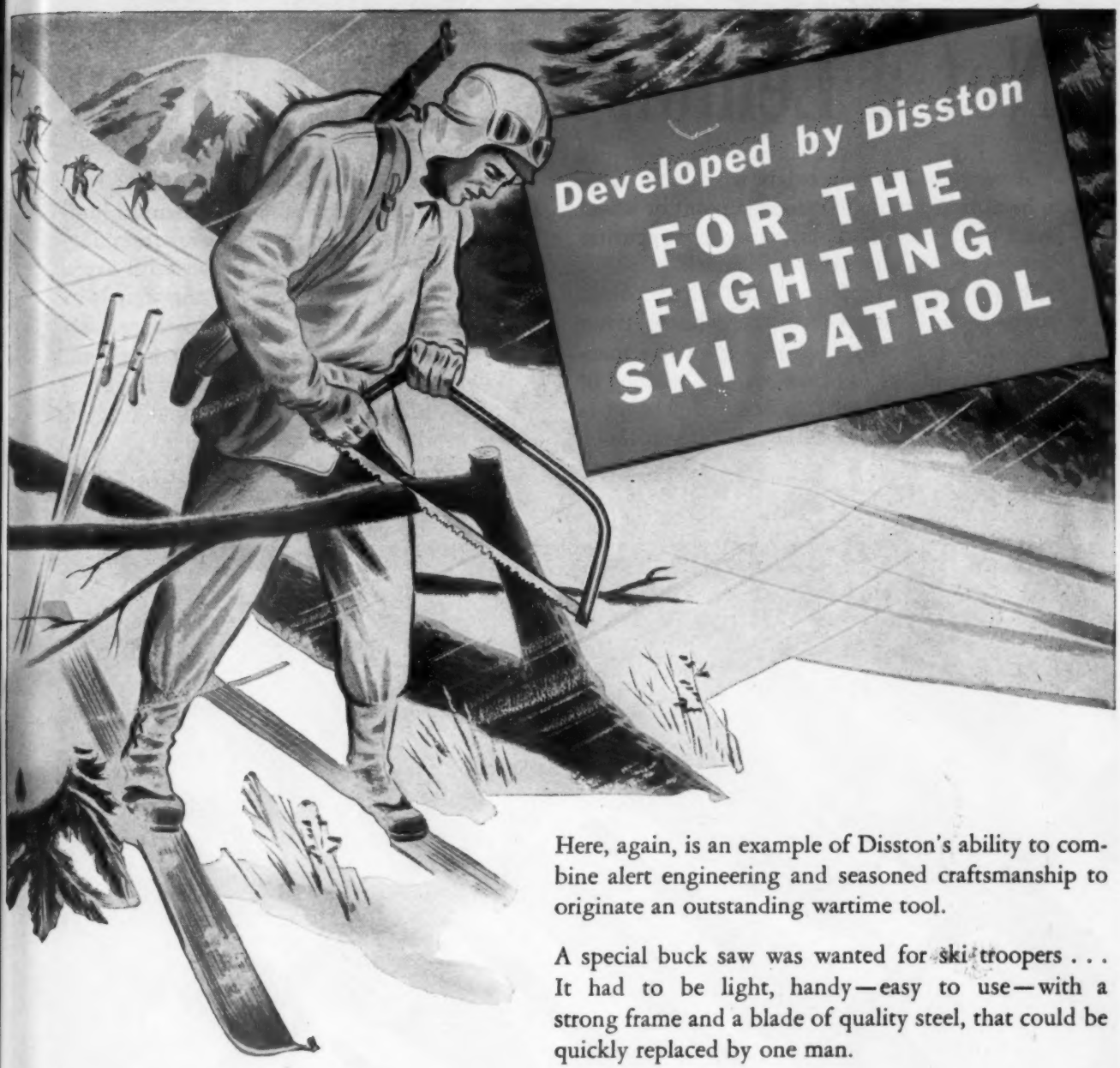
TORNADO WRITING and ETCHING TOOLS

TORNADO Electric Writing Tool is used for marking everything—brass, marble, tile, glass, plastics, wood, hard rubber, aluminum, steel and bronze.

TORNADO Electric Etchers are used for marking valuable dies, tools and other portable equipment. Contact point of Etcher, when applied to product, burns permanent identification.

WRITE FOR COMPLETE DETAILS

BREUER ELECTRIC MFG. CO., 5084 N. Ravenswood Ave., Chicago 40, Ill.



THE MOUNTAIN BUCK SAW
Patent Applied For

DISSTON

Conserve Man-Minutes *and help win the war*

Here, again, is an example of Disston's ability to combine alert engineering and seasoned craftsmanship to originate an outstanding wartime tool.

A special buck saw was wanted for ski troopers . . . It had to be light, handy—easy to use—with a strong frame and a blade of quality steel, that could be quickly replaced by one man.

Disston went to work—and in record time developed an original type of Mountain Buck Saw that fitted requirements to a T. It is surprisingly light . . . Can easily be carried slung on a trooper's shoulder . . . It has a fast-cutting blade of fine Disston Steel . . . And its cam method of tension, with a special handle, makes blade-changing a matter of seconds—even in the dark!

Such special wartime products by Disston are born out of a vast fund of experience backed by modern manufacturing facilities, developed in producing Disston *standard tools of quality.* For information about such widely used standard Disston tools as wood and metal cutting saws, files, hack saw blades, tool bits and machine knives, write Henry Disston & Sons, Inc., 220 Tacony, Philadelphia 35, Pa., U. S. A.

Not a Lemon in a Blue Moon

A very good reason exists why you'll have a hard time finding a mounted point or wheel with hard and soft spots among those bearing the Bay State *blue flash* trademark.

Bay State manufactures mounted points and wheels in *blank* form then shapes, trues and sizes them after mounting on the mandrel, in contrast to other makers' method of *pressing* into shape. The finished product is sharp, smooth-running the instant you touch it to the work — no wasteful "breaking-in" period required.

In a broad range of abrasive products, Bay State offers extra advantages... the finest honing and superfinishing stones ever manufactured... portable snagging wheels with extra safety features... precision grinding wheels in fractional grades...etc. Plus engineering assistance to help you get the most from grinding.

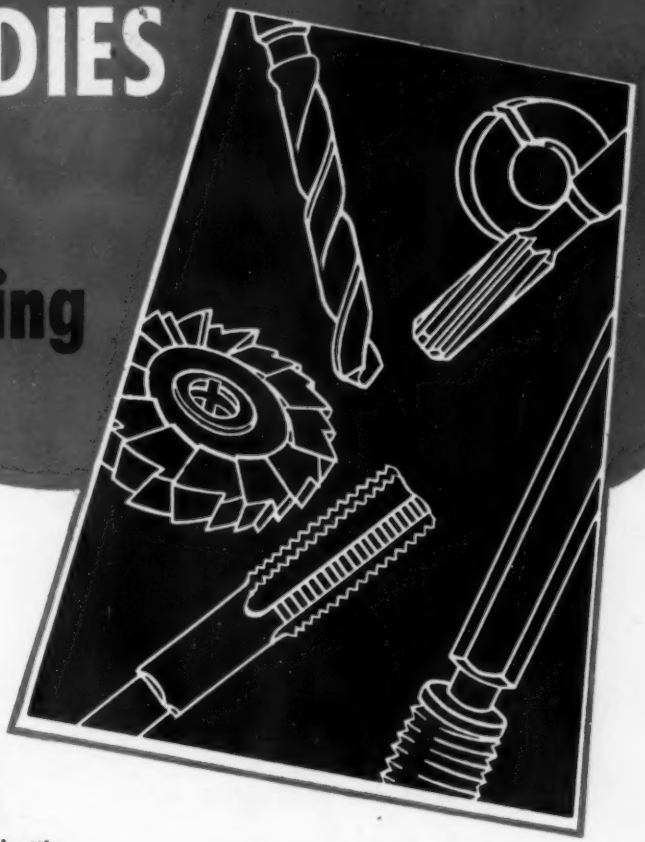
Do you have the handy, pocket-sized catalog of Bay State Mounted Wheels and Points? If not, send right away, for Catalog D.

BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASS.

BLUE FLASH GRINDING WHEELS *FAST and COOL*

HONING AND SUPERFINISHING STONES · CUT-OFF WHEELS · INSERTED-NUT DISCS AND CYLINDERS
PORTABLE SNAGGING WHEELS · MOUNTED WHEELS AND POINTS · GRINDING WHEELS

Faster, more effective *Degreasing* of TOOLS and DIES *before* hard chrome plating



Essential chemically clean surfaces assured by *NEW* Oakite technique

Tools, dies and guages are critical implements in the battle of production. Hard chrome plating of surfaces conserves them ... extends their useful life. For the essential CHEMICALLY clean steel surfaces required before plating, use that outstanding wartime material known as ...

OAKITE COMPOSITION No. 90

The effective wetting-out, emulsifying and penetrating properties of this quick-acting ANODIC degreasing material SPEEDILY, completely remove insoluble smut, grease, shop dirt and other accumulations. Resulting CHEMICALLY CLEAN surfaces assure uniform, more durable deposit of hard chromium plate! Your nearby Oakite Technical Service Representative will gladly give you full details on this important production operation, or write us direct.

STRIPPING OLD CHROMIUM DEPOSITS

Where tools, gauges and dies are to be replated, successful Oakite techniques are available for quickly stripping chromium deposits from surfaces. Take advantage of FREE Oakite Wartime Service and experience on this or any other trouble-causing production cleaning problem.

Manufactured only by

OAKITE PRODUCTS, INC., 24 Thames Street, NEW YORK 6, N.Y.

Technical Service Representatives in All Principal Cities of the United States and Canada

OAKITE MATERIALS...METHODS...SERVICE

CLEANING FOR EVERY CLEANING REQUIREMENT

SYNCRO

THE NAME

Every Production Man Should Know

If you have special engineering and production problems — let SYNCRO help. SYNCRO engineers have been solving unusual problems every week for factories everywhere. Make use of SYNCRO'S complete manufacturing facilities for the development of precision machine tool parts — special tools — fixtures — production parts — now and after Victory.

The experience and skill of SYNCRO engineers and craftsmen is at your service — now and after Victory.

•

SYNCRO DEVICES, INC.
3265 Bermuda Avenue
Dept. AM-124 — Ferndale 20, Michigan

MANUFACTURERS OF PRECISION MACHINE TOOL PRODUCTS

Quick Boring

Universal Mikro-lok Boring Bars are designed for finishing cuts where extreme accuracy is required. Especially adapted for boring to a shoulder, or to the bottom of a hole or where intermittent cuts are being taken. Extremely rigid. Easily and quickly adjusted like a micrometer to limits of .0005 or less. Available singly or in sets. Write for facts and prices.

UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN

Investigate

THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER *on Your Work*

Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

• Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1⅞" to 12". It will keyseat in blind holes, taper holes, and offset holes. We also manufacture oil-grooving millers.

WRITE today for Catalog No. 15

NATIONAL MACHINE TOOL CO.
CINCINNATI, OHIO

BIRDS OF A FEATHER . . .

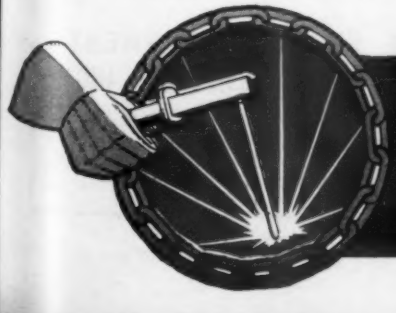
Mocking birds don't mate with meadow larks . . . nor do robins and barnyard ducks lay eggs in the same nest. Birds of a feather just naturally flock together . . . keeping each species separate, distinctive, true to type.

It's the same way with Welding Electrodes.

Each technological welding application requires electrodes of individual chemical and metallurgical properties . . . maintained absolutely *true to type* in *every classification* and in *each rod* of that classification.

The McKAY COMPANY, in developing better Welding Electrodes, rigidly adhered to the policy of making *each* grade of electrodes "a leader in its line." Just to make sure that no "ugly duckling" will ever appear **McKay Stainless, Alloy or Mild Steel Welding Electrodes** are constantly "researched" in one of the nation's great technical institutes.

The same careful control is exercised in the development and production of other McKAY products including **Commercial Chain** for every purpose and **McKay Tire Chains.**

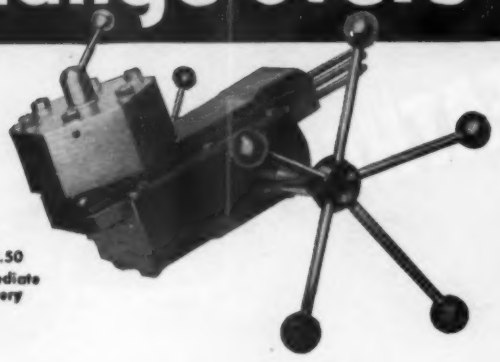


General Sales Office: York, Penna.

PITTSBURGH, PA.

WELDING ELECTRODES . . . COMMERCIAL CHAINS . . . TIRE CHAINS

for QUICK change-overs



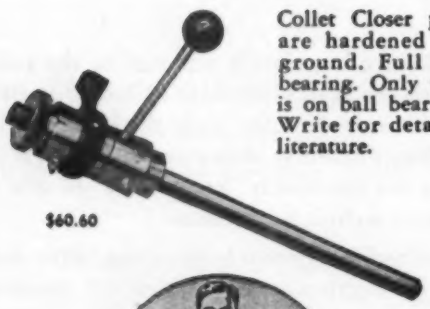
$197.50
Immediate Delivery

UTILITY TOOLS

In a matter of minutes you can convert your engine lathes into screw machines. Simply remove tail stock and install a Utility Turret and Crossfeed Cut-off. Turret has rack and pinion which assures steady feed. Raised bearing surface eliminates all chip trouble. Has two taper gibs for take-up and alignment. All ways and bearing surfaces are ground. All inserts, bushings and pins are hardened and ground. Hex is 5⅛" across flat, 2-7/16" thick. Accommodates a ¾" hole or a No. 1 or 2 Morse taper. Fits Logan, South Bend, Atlas, Craftsman, 10" Sheldon, Clausing, etc.

Cross Slide pictured here has rack and pinion, two tool holders with adjustable jacks. Weight approximately 40 lbs.

$55.00



$60.60

Collet Closer parts are hardened and ground. Full ball bearing. Only wear is on ball bearings. Write for detailed literature.

UTILITY TOOL and DIE MFRS.

1370 West Washington Blvd.
LOS ANGELES 7, CALIFORNIA

CURVED . . .
CONCAVE . . .
CONVEX . . .
STRAIGHT LINE . . .

with Matthews "Safe-Hed"
STEEL STAMPS

Matthews "Safe-Hed"*—"Tuf-Face"* steel stamps are used for marking all types of products . . . with trade marks, names, patent numbers, etc. Tell us how you want to use them and we'll make stamps to suit your stamping application.

Write for Catalog 146-A

*REG. U. S. PAT. OFF.

JAS. H. MATTHEWS & CO.
3956 Forbes Street Pittsburgh 13 Pa.
Branch Plants
New York, Boston, Chicago, Philadelphia, Newark, Syracuse
District Sales Offices
Cleveland Detroit Hartford Birmingham

The GLENNY *Adjustable-Expansion* BROACH

Produces low cost, accurate keyways. Eliminates set-up time. Self aligning. Interchangeable parts. Adapted for arbor press, mechanical or hydraulic pressure. Speeds up production. Cutter bars in carbon or high speed steel. Details? Write!

EAST SHORE MACHINE PRODUCTS CO.
833 E. 140TH ST. CLEVELAND, OHIO

Famous for

- ACCURACY OF THREADS
- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advt. on page 274 Nov. 11, '48 American Machinist

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
Los Angeles: A. C. Behringer, 824 N. San Pedro St., San Francisco: Guy Reynolds, 464 Vernon St., Oakland, Canada: Arthur Jackson Mech. Tool Co., Toronto and Montreal.

HARDNESS TESTER

Let the SCLEROSCOPE speed up the production of that s so we can blow the Axis to HELL

Write for Circular!

THE SHORE INSTRUMENT & MANUFACTURING CO., INC.
9025 VAN WYCK AVENUE
JAMAICA, NEW YORK
TELEPHONE: JAMAICA 6-4090

PHYSICAL AND CHEMICAL PROPERTIES OF "dag" COLLOIDAL GRAPHITE

Available as a smooth, black, liquid concentrate, Dag colloidal graphite puts a versatile company of physical and chemical properties at your service. Fifteen of the more important of these properties are listed here with a different color given to each for easy reference.

Match these properties by color with the colors on the medals below. Each medal represents a typical performance "citation" to Dag colloidal graphite. Dozens more could be shown, if space permitted, because this product is a dry film, a fluid film, a surface coating, an impregnation—and a few other things besides.

"Mr. Dag"

1 Slippery—a Good Lubricant. Softer than talc

2 Conducts Electricity

3 Withstands Temperature Extremes

4 Absorbs, Radiates and Conducts Heat

5 Maximum Purity

6 Low Coefficient of Expansion

7 Particles Bear Like Electric Charges

8 Insoluble in Acids and Alkalies

9 Black and Opaque

10 Gas Adsorbent

11 Little Photoelectric Effect

12 Miscible with Most Fluids

13 Films Adhere Tenaciously and Dry with Sharp Edges

14 Microscopically Fine Particles.

15 An Excellent Suspension

2, 14, 13, 15
CITATION: "Drive belts and other nonconductors traveling at high speed accumulate static charges which under certain conditions may constitute a hazard. This static electricity is controlled and bled-off harmlessly by a Dag colloidal graphite conductive film."

1, 3, 5, 14, 15
CITATION: "When the work rotating chuck of this large honing machine was assembled and run-in using Dag colloidal graphite, running-in time was reduced approximately 35%, operating temperature dropped considerably, and the danger of bearing damage due to temporary oil film failure was eliminated."

9, 13, 6, 14, 15
CITATION: "Dag colloidal graphite is used to retouch photograph negatives because of its complete opacity, because a film of minimum thickness is required and because it dries with a sharp edge."

PIN A MEDAL ON YOURSELF!

CHECK THE LIST and pick out those properties which you can use. Then state your problem to us and let our engineers give you the benefit of their experience. It is quite possible that they have already studied a parallel application. You'll pin a medal on yourself for calling in Mr. Dag.

Dag, Oildag, Aquadag, Castordag, Glydag and Prodag are registered trade marks of Acheson Colloids Corporation.
Copr. 1944 by Acheson Colloids Corp.

dag COLLOIDAL PRODUCTS

ACHESON COLLOIDS CORPORATION
PORT HURON, MICHIGAN

HOW DOES THE GAGEMAKER *Check the Gages* HE MAKES ?

Plug gages being checked to a tolerance of a few millionths of an inch at Republic Gage Company, Detroit.

Gages must be accurate to within infinitesimal tolerance limits—a very few millionths of an inch. These "millionths" *must be measured accurately.*

The Republic Gage Company and hundreds of other gagemakers *know* their gages *are right* because they use Sheffield Visual Gages for final inspection. This widespread use by gagemakers is testimonial proof of dependable, highly accurate performance of the Visual Gage *—the gage by which other types of gages are checked.*

DELIVERY WITHIN TWO WEEKS can be made of your Visual Gage requirements for production and gage inspection. Six amplifications, 500, 1000, 2000, 5000, 10,000 and 20,000 to one. Wire or write for quotation.

ARMY E NAVY

SHEFFIELD

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS • GAGES • DIMENSIONAL CONTROL • CONTRACT SERVICES

ARMSTRONG

Your Post-War Re-Conversion Will Start With ARMSTRONG TOOL HOLDERS

Just as the shift to war production started in the tool rooms and die shops of America with ARMSTRONG TOOL HOLDERS, so will the re-conversion to post-war products start on the tool room lathes, planers, slotters and shapers. Now is the time to equip each of these machine tools with its full complement of ARMSTRONG TOOL HOLDERS. They will enable you to increase production of War Material NOW, for with the correct ARMSTRONG TOOL HOLDER for each operation you can step up speeds and feeds (often double hourly output) safely and without loss of cutting efficiency. Then too, when the war ends you will be tooled-up for every operation, ready to start *instantly* on re-converting your plant to post-war production.

Write for Catalog today

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
315 N. Francisco Ave., Chicago, U. S. A.
Eastern Warehouse & Sales:
199 Fafayette St., New York

ARMSTRONG TOOL HOLDERS Are Used In Over 96% of the Machine Shops and Tool Rooms

•Heavier Loads

•Faster Speeds

•Deeper Cuts

with **IDEAL**

LIVE CENTERS

IDEAL Live Centers help you turn out MORE work in LESS time, on lathes, millers, grinders, etc. They turn heavier loads and make deeper cuts — faster, because they rotate with the work. Precision built — radial load is carried by high precision ball bearing, thrust load is absorbed by high precision taper roller bearing.

FOUR *INTERCHANGEABLE INSERTS for all kinds of centered and uncentered work.*

IDEAL ELECTRIC TACHOMETER

Checks R.P.M. Instantly

Accurate to plus or minus 1 per cent of full scale deflection. Can be used as "Hand Type" or with generator separated from meter as "Separable Type." 2 Sizes—0 to 2500 RPM and 0 to 5000 RPM.

★ ★ ★

IDEAL "Machine Shop" ETCHER

Permanently Marks All Metals

New, All-Purpose Etcher for permanently marking smooth-surfaced iron, steel, and their alloys. 14 heats, 115 to 1300 watts. Etches legibly, easily, permanently regardless of the hardness of the metal. Ground clamp for etching large parts and castings.

★ ★ ★

IDEAL DEMAGNETIZERS

Keep Tools Sharp Longer

Removes metallic dust, flakes, fine chips, etc., clinging to cutting edges, by a single pass across the demagnetizer. Powerful—Portable.

FREE Machine Tool Accessories Catalog, gives information on these and many other time-saving tools.

IDEAL *Sycamore*

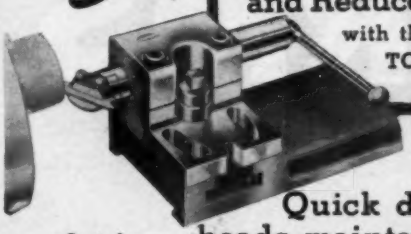
IDEAL COMMUTATOR DRESSER CO

1057 Park Avenue **Sycamore, Illinois**

Sales offices in all principal cities

In Canada: IRVING SMITH, LTD., Montreal, Quebec

Simplify... **Engine lathe OPERATIONS and Reduce "REJECTS"** with the LANE-WELLS TOOL HOLDER



Quick detachable heads maintain precision and cut tool changing time

Quick Detachable heads

BORING

FORMING

FACING

TURNING

With Lane-Wells Tool Holder you can cut tool changing time to less than five seconds and give your engine lathe the speed, accuracy and precision of a "turret lathe." The increased production and time saved has cut machining costs as much as ⅓ on quantities of production pieces. Standard tool bits are used for high speed operations.

After sizes are established all readings can be taken from the cross-feed dials. Work can be interrupted and then resumed without the necessity of long tooling set up. Available for all standard engines lathes from 9" to 36" swing.

Send for Bulletin

LANE-WELLS COMPANY

Engineers and Manufacturers

5610 South Soto Street · Los Angeles 11, California

"ROCKWELL" HARDNESS TESTER

QUICK DELIVERIES

Shipment of normal type hand-operated machines can be made in less than a week.

NEW MODELS

are enormously improved.

Made Only By

WILSON

MECHANICAL INSTRUMENT CO. INC.

Concord Ave., New York 54

PHOENIX

ADJUSTABLE LIMIT

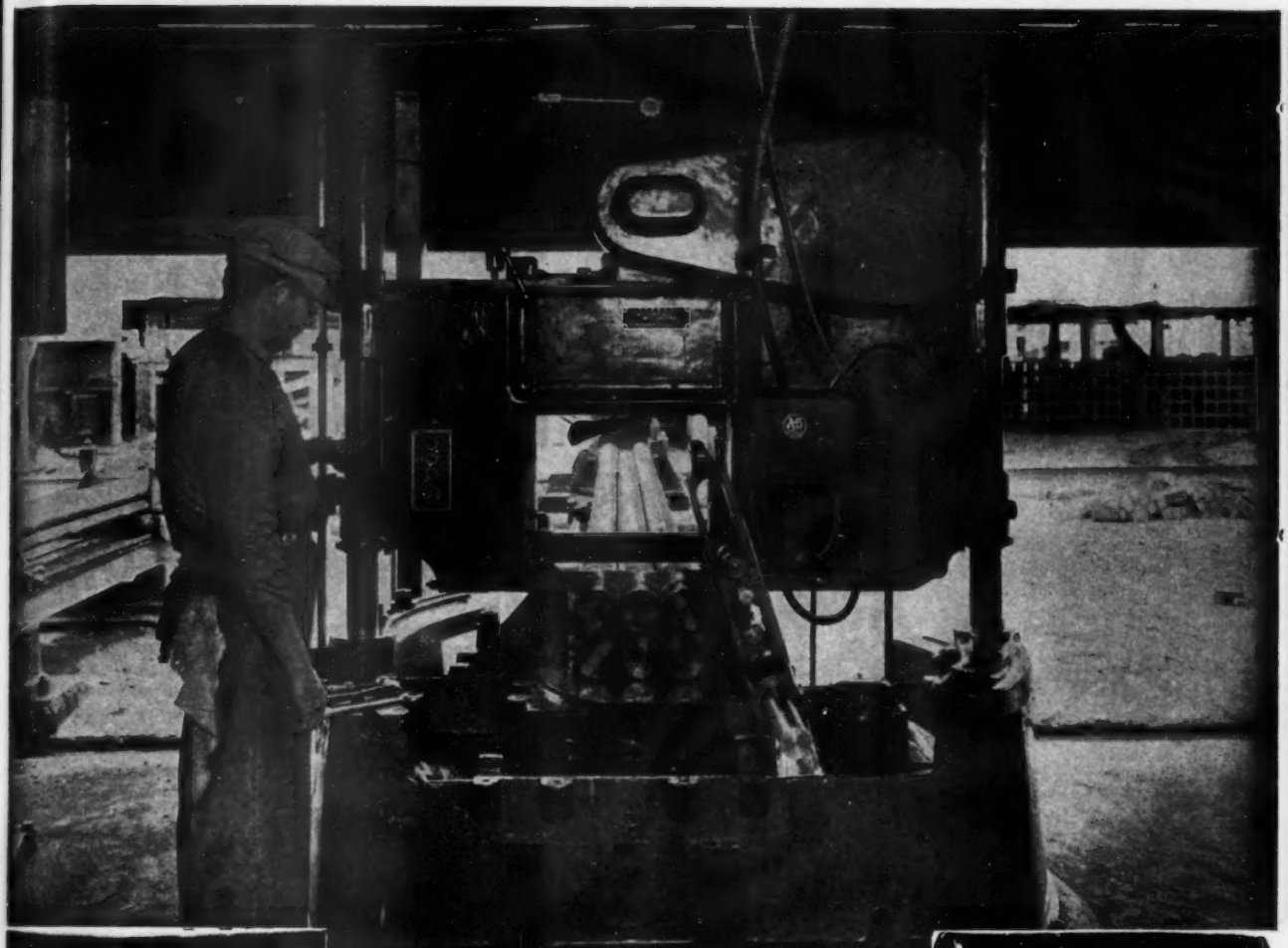
SNAP GAGE

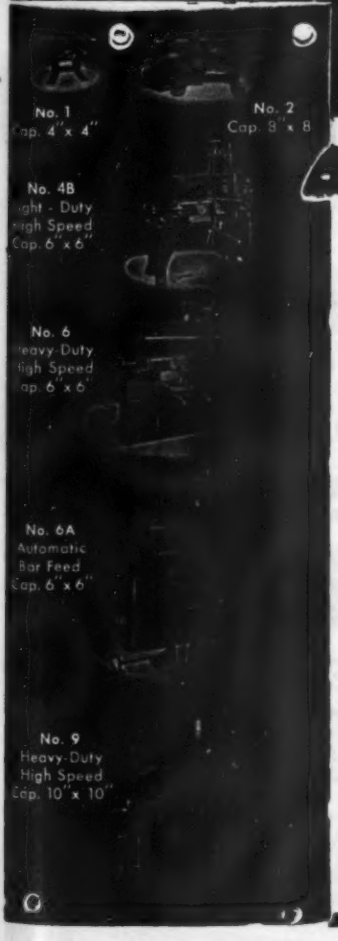
A Gage with Locking Cams which will stay set

Good Delivery

Send for Folder

PHOENIX GAGE CO., Phoenix, N.Y.





MARVEL SAWS

Cut anything that will go between the jaws

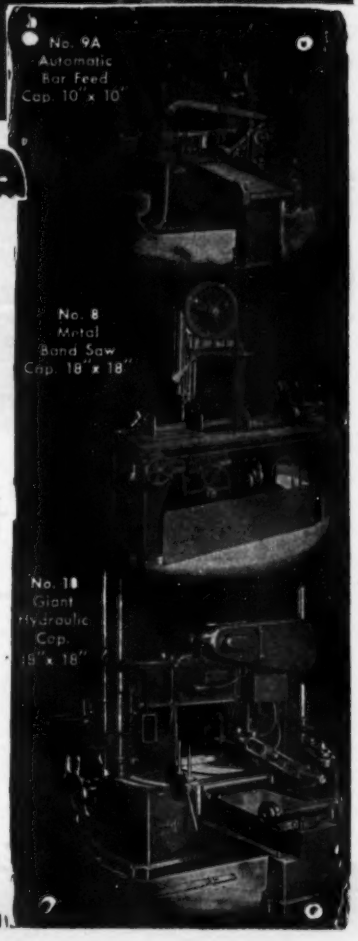
This is one of five No. 18 MARVEL Giant Hydraulic Hack Saws used by a well known Texas tool company to cut-off "multiple bars of alloy steel in round, square, and flat shapes, up to the maximum capacity of the large work-throat (18" x 18").

These super hack saws are designed for the largest sizes, and toughest steels—up to 18" x 18". After a year's heavy duty service, when asked as to the effectiveness of these saws in solving the cutting-off problems at this plant, the mechanical engineer in charge reported them "very effective."

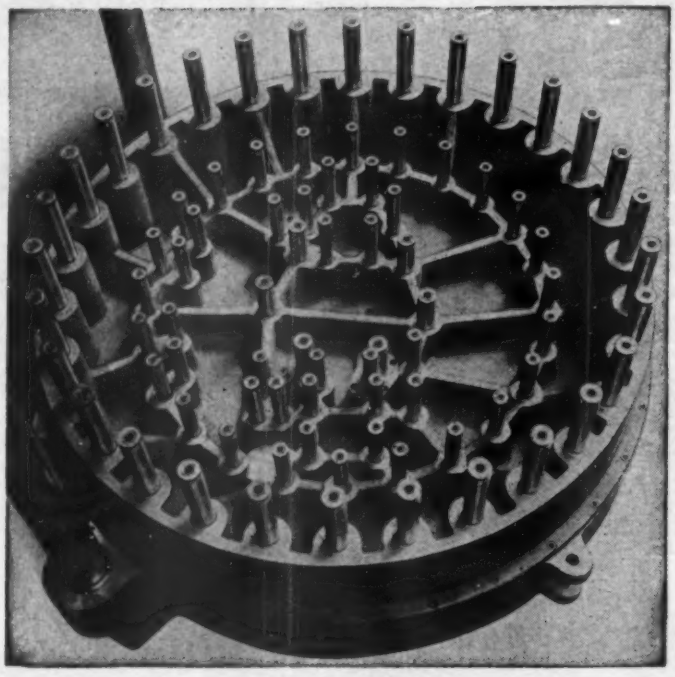
ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. Chicago, U. S. A.
Eastern Sales Office: 225 Lafayette St., New York



MULTIPLY PRODUCTION



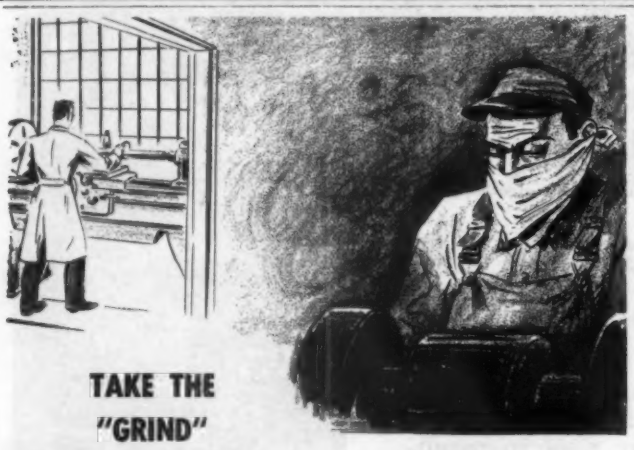
WITH Buhr

MULTIPLE SPINDLE DRILL HEADS

TYPICAL EXAMPLE IS THIS 82 SPINDLE BUHR HORIZONTAL DRILL HEAD *for drilling* 32-.257, 14-5/16, 36-17/32 dia. holes. This is the right hand head of a 2-way Hydraulic Horizontal Machine. All spindles and gears are of alloy steel heat treated and ground, ball bearings are used throughout and an oil pump keeps them in a bath of oil. Vertical adjustment is provided in all spindles to compensate for unequal drill lengths and to adjust drills to proper depth.

Send blueprints for suggestions and recommendations to speed *your* production for quicker victory.

BUHR MACHINE TOOL COMPANY
ANN ARBOR MICH.



TAKE THE "GRIND" OUT OF GRINDING

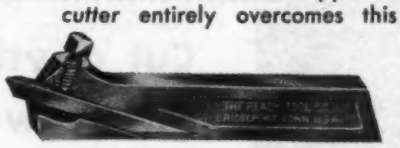
A man can't do good work and breathe bad air. Too much dust and grit in the air makes it hard to breathe . . . and handicaps production. There's no reason why the fellow who works on a grinder or buffer can't be as happy at his work as the guy in the next department. The "grind" of grinding is caused by loose dust and grit.

A Cincinnati Air Master on the job traps dust and grit . . . the very second it flies from the wheel. It protects worker, work and machinery. It helps "up" production. It's easy to install . . . easy to clean. Three sizes—to fit all grinders and buffers. Write today—now—for descriptive literature.

The Cincinnati
ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS
The Cincinnati Electrical Tool Co. 2676 MADISON RD.

PREVENTS BREAKING TOOL BITS

Because *a file hard support under the cutter* entirely overcomes this trouble.



Send for complete catalog A37

THE READY TOOL COMPANY
Iranistan & Railroad Aves., Bridgeport, Conn.

CRAFTS

CARBIDE TIPPED GAGES AND TOOLS

Consistent Quality

ARTHUR A. CRAFTS COMPANY, INC.

603 Newbury Street *at Kenmore Sq.* BOSTON
DETROIT • CHICAGO

Reduce Replacement Costs

by Hard-Facing with Haynes Stellite Rods

THE life of wearing parts of industrial machines and equipment can in many cases be increased from 2 to 25 times by hard-facing with Haynes Stellite rods.

Hard-Face All Parts— Old and New

Old parts which are badly worn can often be reclaimed and armored against wear by applying Haynes Stellite rods. To assure maximum savings, it usually pays to hard-face new parts—*before* wear occurs. Then when long use finally does impair their efficiency, most parts can be hard-faced again and again for added service.

Other Advantages of Hard-Facing

The use of Haynes Stellite hard-facing materials frequently permits use of cheaper base metals—or makes possible the use of a readily available substitute base metal when the usual kind cannot be obtained. When cutting or scraping edges are hard-faced, they stay sharp longer, often reducing power consumption. Time out for repairs is cut down by hard-facing, and this helps maintain high production schedules. At the same time, hard-facing decreases maintenance work and solves many replacement problems.

Wherever abrasion . . . impact . . . heat . . . or corrosion . . . are encountered, there's a Haynes Stellite rod to furnish lasting protection. Write for a descriptive price list.

A Rod for Every Purpose

Stellite Rod – the original non-ferrous cobalt-chromium-tungsten hard-facing alloy —now available in three different grades— high in "red hardness," highly resistant to abrasion and corrosion—applied by oxy-acetylene or electric-arc process.

Hascrome Rod—iron-base hard-facing rod containing chromium and manganese – work-hardens under impact – applied by oxy-acetylene or electric-arc process.

Stellite "93" Rod – iron-base hard-facing alloy containing more than 40 per cent of alloy ingredients – hard and abrasion-resistant – applied by oxy-acetylene or electric-arc process.

Haystellite Inserts—cast tungsten carbide in 13 standard shapes and sizes—extremely resistant to abrasion—generally applied by oxy-acetylene process with high-strength steel rod as binder.

Haystellite Tube Rod—tungsten carbide grains of 9 standard screen sizes in high-strength steel tubes—extremely wear-resistant—applied as hard-facing rod, generally by oxy-acetylene process.

Haystellite Composite Rod—tungsten carbide grains of 4 standard screen sizes uniformly distributed in high-strength steel binder – extremely wear-resistant – applied as hard-facing rod, generally by oxy-acetylene process.

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

New York 17, N. Y. UCC Kokomo, Ind.

Chicago—Cleveland—Detroit—Houston—Los Angeles—San Francisco—Tulsa

HARD-FACING RODS FOR EVERY PURPOSE

"Stellite," "Haystellite" and "Hascrome" are registered trade-marks of Haynes Stellite Company.

MERZ

IS EQUIPPED FOR ANY PRODUCTION-TOOLING PROGRAM

Whether your requirements call for a single gage or fixture—or a complete production tooling program—Merz is equipped to serve you. We have the machines and engineering personnel to provide precision-built tools that will insure greatest accuracy and efficiency in production.

Our modern plant, built and equipped in 1940 with the very latest models of the country's finest machine tools, has facilities available, now, for additional production. Write, today, for new literature entitled, "4 Spheres of Service to American Industry." Mailed free to responsible executives.

MERZ *Engineering Company*

INDIANAPOLIS 7, INDIANA

1905 **Strand** 1944

QUALITY

FLEXIBLE SHAFTS and MACHINES

3 Speed Vertical

One Hundred Twenty-five Types and Sizes.
Capacities 1/8 to 3 H.P.
Rotary Files.

Send for Catalog

High Speed Steel Hand Cut Rotary Files Ground Cutters

N. A. STRAND CO.

5001-5009 Wolcott Ave. Chicago 40, Ill.

Getting His Size for a Wooden Overcoat

With

MASTER GAUGES

THREAD PLUGS	PROFILE
THREAD RINGS	BUILD-UP
PLAIN PLUGS	CONCENTRICITY
PLAIN RINGS	JIGS and
SNAP	FIXTURES

MASTER GAUGE CO.

2214 FENKELL AVE. DETROIT 21, MICH.

Phone: University 3-7676

IMPROVE FINISH - REDUCE COSTS

BY KEEPING GRINDING COOLANT CLEAN WITH DE LAVAL EQUIPMENT

THE De Laval "Hermetic" Coolant Clarifier employs centrifugal force to continuously remove from grinding coolant even the tiniest particles of metal and abrasive.

Continuous removal of these impurities avoids scratches on the work, avoids damage to sub-surface structure and makes it possible to grind within closer limits. Moreover, it enables the same coolant to be used indefinitely and so makes it economical to employ the kind of coolant best adapted to the work—regardless of cost.

In most grinding operations numerous other economies are effected by the De Laval Coolant Clarification System. Softer wheels can be used; the life of wheels is increased; production is speeded up, and there are fewer rejections.

Write for full information regarding these and other economies effected by De Laval centrifugal machines in modern metal working plants.

DE LAVAL "Hermetic" COOLANT CLARIFIER

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 427 Randolph St., Chicago
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco
THE DE LAVAL COMPANY, Limited
Montreal Peterborough Winnipeg Vancouver

THIS JOB *Couldn't Be Done*

But It Was—

Thanks To

GRAY-MILLS *Portable Coolant Systems*

THIS job of cutting magnetic steel couldn't be done, because these Radial Cutter Grinders were not originally equipped for coolants. Yet, the job was done . . . by applying the coolant with Gray-Mills G-3A Portable Coolant Systems.

Today, as this application illustrates, there is no need to forego the advantages of coolants even though your machines aren't equipped with coolant applying systems. Gray-Mills Portable coolant systems are moderate in cost . . . can be hooked up for operation by your own maintenance man quickly, without fuss. In savings on tools alone, Gray-Mills Systems will pay for themselves within a few months.

Gray-Mills Portable Coolant Systems offer all of the advantages of built-in systems: controlled flow; capacities up to 3000 gals. per hr., high volume, or high pressure, baffle plates and screens to filter out chips and abrasives. An automatic pressure relief valve protects the motor against overloads.

Don't deny yourself production-jumping, tool-saving, cost reducing coolants. Apply them with Gray-Mills, (self-contained) Portable Coolant Systems. Ask your mill supply or machinery distributor for a demonstration.

Write for Complete Details. IMMEDIATE SHIPMENT

GRAY-MILLS CO.

208 W. Ontario Street ★ Chicago 10, Illinois

4 Heavy Duty "A" Series Models—with large capacity coolant tanks incorporating forced settling baffles and screen strainers. Capacities from 60 to 180 G.P.H., Pressures from 15 to 50 lbs. P.S.I.

3 Model "G" Series (Round Tanks). Small compact units—with capacities from 60 to 130 G. P. H., Pressures from 10 to 20 lbs., P. S. I.

GRAY-MILLS *Complete Portable* **COOLANT SYSTEMS**

Use GRAY-MILLS COOLANTS . . . 5 types for most requirements — 10 to 55 gal. containers — immediate delivery from your distributor or our plant.

SAVING $26 to $39 EVERY WEEK

Dumping processed chips from removable Basket of American Chip Wringer

A New Jersey manufacturer* reports that on the basis of present savings, their American Chip Wringer will pay for itself in 6 to 9 months. That means this manufacturer is saving from $26 to $39 each week with an American Chip Wringer.

In less than 3 minutes an American Chip Wringer reclaims more than 90% of the cutting oil from a load of metal chips and machine turnings. Any unskilled person can operate it.

American Chip Wringers are available in following models: $20, $26, $30, $40, $48.

WRITE TODAY FOR ILLUSTRATED CATALOGS

ARMY E NAVY

CINCINNATI PLANT

* Name furnished on request.

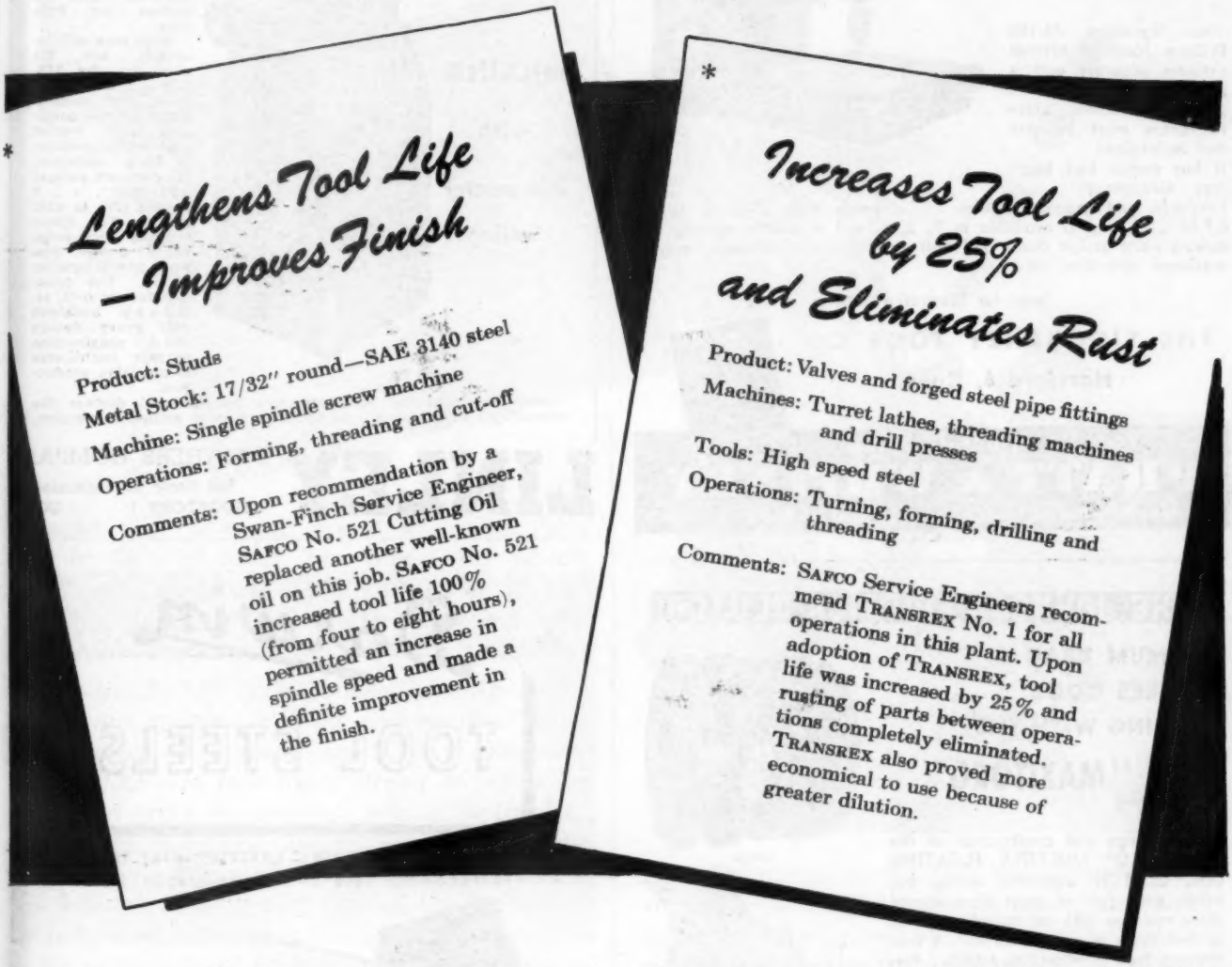
The AMERICAN LAUNDRY MACHINERY COMPANY

CINCINNATI 12, OHIO

We'll Underwrite Your Test of SAFCO Cutting Oils and Compounds

YOU'LL GET IMPROVED RESULTS—LONGER TOOL LIFE —FASTER PRODUCTION—OR YOUR MONEY BACK!

*RECENT REPORTS ON ACTUAL PLANT TESTS OF SAFCO CUTTING OILS


*
Lengthens Tool Life —Improves Finish
Product: Studs
Metal Stock: 17/32" round—SAE 3140 steel
Machine: Single spindle screw machine
Operations: Forming, threading and cut-off
Comments: Upon recommendation by a Swan-Finch Service Engineer, SAFCO No. 521 Cutting Oil replaced another well-known oil on this job. SAFCO No. 521 increased tool life 100% (from four to eight hours), permitted an increase in spindle speed and made a definite improvement in the finish.
*
Increases Tool Life by 25% and Eliminates Rust
Product: Valves and forged steel pipe fittings
Machines: Turret lathes, threading machines and drill presses
Tools: High speed steel
Operations: Turning, forming, drilling and threading
Comments: SAFCO Service Engineers recommend TRANSREX No. 1 for all operations in this plant. Upon adoption of TRANSREX, tool life was increased by 25% and rusting of parts between operations completely eliminated. TRANSREX also proved more economical to use because of greater dilution.

The test cases outlined above are representative of hundreds which fill our files. SAFCO's superiority can be readily established and is convincingly *demonstrated* in *your* plant with *your* foreman the test supervisor.

SAFCO Cutting Oils and Compounds have proved their fitness under all kinds of conditions. They can step up production and reduce tool replacement cost for you, too.

All we ask is your cooperation in letting a Swan-Finch Service Engineer analyze your condition and recommend the SAFCO Cutting Oil or Compound best suited to *your* needs. If you're not satisfied that it gives you better performance, we'll cancel your invoice. Why not write or phone our nearest office and ask to have the Swan-Finch man in your locality call—and arrange the details for you?

Swan-Finch Oil Corporation

R. C. A. BUILDING (WEST), NEW YORK 20, N. Y. • 2596 Hart Avenue, Detroit 14, Mich. • 201 North Wells Street, Chicago 6, Ill.

SCIENTIFIC LUBRICATION—MAKERS AND MARKETERS OF SAFCO CUTTING OILS AND COMPOUNDS
SAFCO CORE OILS · SAFCO MAINTENANCE LUBRICANTS · SAFCO LUBRICATING SPECIALTIES

SIGOURNEY M-100

FOR CLOSE TOLERANCE DRILLING

The Sigourney M-100 Drilling Machine affords extreme accuracy and is particularly applicable to production where close tolerances must be met and maintained.
It has sealed ball bearings throughout . . . hardened and ground spindles . . . speeds from 4000 to 10,000 R.P.M. . . . and is available in 1, 2, 3, and 4 spindle models. All moving parts except chuck and drill are completely enclosed, insuring maximum operating safety.

Send for illustrated Bulletin

THE SIGOURNEY TOOL CO.
Hartford 6, Conn.

Sole Sales Agents
PRATT & WHITNEY
Division Niles-Bement-Pond Co. West Hartford, Connecticut

THE JOHNSON FRICTION CLUTCH

MINIMUM DRAG ASSURES COOL RUNNING WITH THE

NEW "MAXITORQ"

Single

In the design and construction of the "MAXITORQ" MULTIPLE FLOATING DISC CLUTCH, separator springs between each pair of inner discs spread these endways with an accordion action so that there is space between. A true floating type construction results. This feature accounts for a minimum of drag, abrasion or heating in neutral and contributes to remarkably smooth operation as well as quick disengaging.

Other features of performance and operation include simple manual adjustment, sensitive starting, safety and quietness. Heat and abrasion, ordinarily inherent in many clutches of the multiple disc type are eliminated in the "MAXITORQ."

Double

Send for dimension sheets and specifications covering the sizes and types available.

WRITE FOR MULTI DISC CLUTCH CATALOG NO. 23 OR CONSULT SWEET'S OR THOMAS' REG.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER, CONN.

Here's **SPEED** . . **FAST SET-UP and ACCURACY**

JIG BORING • MILLING *with* Micrometer Setting

Most every machine shop has one man who's a "wiz" at cutting corners, devising tricky methods and set-ups to produce dies, patterns, molds, jigs, fixtures, etc.
But his time is valuable . . . and he may be tying up machines of larger capacity than required for little jobs.
Such men will instantly see the need for the LINLEY—an all-around time and money-saver for the countless and varied jobs which confront a busy toolroom. It's compact, rugged and fast . . . 8 speeds (275 to 4250 r.p.m.) The direct reading micrometer depth gauge prevents pencil figuring errors. The counterbalanced quill removes backlash and every design and construction feature contributes to precision production.

Why not send for our instructive bulletin and discuss the advantages of a Linley installation with your skilled machinists.

LINLEY BROTHERS COMPANY
664 State St. Extension
BRIDGEPORT 1 CONN.

Darwin

TOOL STEELS

A NEW CATALOG CONTAINING ANALYSES, HEAT TREATMENT, PERFORMANCE DATA AND RECOMMENDED USES.

This catalog contains up-to-date information on heat treating of tool steel. The steels described in the catalog are specialty products manufactured to lick your tough jobs.

DARWIN & MILNER INC.
highest grade tool steels
1260 WEST FOURTH STREET
CLEVELAND, 13, OHIO

15 holes in 15 minutes!

WITH THE MOORE JIG BORER

Greater accuracy and speed are what you look for in a jig borer. The speed with which accurate settings can be made on the Moore Jig Borer is best shown by the following demonstration, frequently made before witnesses:

Fifteen 3/32" holes, spaced evenly .500" apart, are spotted, drilled and reamed on a template of ⅛" ground stock, to a tolerance of ±.0002"—in less than fifteen minutes. In less than sixty seconds each hole is located accurately! If one boring cut were to be made in order to increase the accuracy to ±.0001", the time for all fifteen holes would be increased by only five minutes.

We do not believe that a similar performance is possible with any other type of jig borer. This unprecedented combination of accuracy and speed is the result of lead screws produced by us under the most advanced methods and ground to a degree of precision never achieved before. They enable the most efficient application in the Moore Jig Borer of the fundamental Coordinate Location System. By means of the two lead screws, working at right angles to each other, the workpiece may be moved into any desired position in relation to the fixed spindle. The operator can set the table instantly and check himself without fear of error.

PARTNERS IN PRODUCTION...*The Moore Jig Grinder* corrects hole distortions after hardening. Among its many operation features is the means of rapid location described above for the Jig Borer. Learn how these two machines will modernize your toolroom operations. Send for illustrated literature *today*.

MOORE TOOLS

MOORE SPECIAL TOOL COMPANY INC.

740 UNION AVENUE, BRIDGEPORT 7, CONN.

TAKING THE TOOL TO THE JOB . . .

. . . speeds up grinding, drilling and finishing operations

STOW FLEXIBLE SHAFT

Mobile Power Units

In these times when every minute counts, you want your electric tools to have both mobility and ruggedness. When you wheel a Stow machine up to the work, you know you can depend on its sturdy motor. And its flexible shaft has the capacity and long life in heavy-duty service which STOW's 68-year experience alone makes possible.

Stow mobile units operate from any electric outlet. They eliminate the need to move heavy work to a stationary tool. Often they operate where ordinary tools can't reach. Many interchangeable attachments are available, to fit the machine for almost any job.

You are certain to have many uses for these efficient, versatile machines. Write today for complete information on models, sizes, prices.

STOW

MANUFACTURING CO.

29 Shear St., Binghamton, N. Y.

Demand these labels when buying uniforms

UNIFORMS OF REEVES ARMY TWILL CAN TAKE IT!

Men who handle machinery demand work uniforms that withstand heavy strain. So specify *Reeves* famous fabrics when ordering *your* uniforms.

Uniforms made of Reeves Army Twill meet exacting U. S. Government Tests for better wear, longer life, color-fastness. Its fabric vitality keeps it "in shape." **GLENGARRIE POPLIN for matching shirts. A durable, stylish fabric that comes in a wide range of colors. Both fabrics are Sanforized* against shrinking.**

***Fabric shrinkage not more than 1%. (U.S. Government Test CCC.-T-191-a.)**

See your nearest dealer for uniforms, sport and work clothes made from these famous fabrics or write for leaflet to:

OVER 60 50 million yards of Reeves Army Twill sold to the U.S. Army

REEVES BROTHERS, INC

54 WORTH STREET NEW YORK

THE ALL-PURPOSE MACHINIST WOOD SOLE SAFETY SHOES

Style No. 200

Davenport Wood Sole Safety Shoes are especially designed where high quality foot protection is a necessity. Its long wearing qualities have been tested and proven under the actual working conditions. Wooden Soles provide sure footing on damp, slippery floors. Hot or rough surfaces cannot injure YOUR FEET.

Vamps and uppers of pliable tough oiled grain leather, sole leather counters; cushion insoles, choice maple soles. Has Buckle and eyelets. Available with safety toes.

F. J. STAHMER SHOE CO.

World's Largest Exclusive Manufacturer of Wood Sole Footwear

2393 BOIES AVENUE DAVENPORT, IOWA

...Are you protecting Your Skilled Workers' EYES?

Many tool makers . . . die makers . . . master mechanics . . . expert lathe operators and other much-needed skilled workers could be helping the war effort and their former employers right now *if* it hadn't been for eye accidents—which could have easily been avoided.

There is an indisputable moral in this condition for those companies that have not yet lost key workers, even though failing to provide them with goggles: *don't continue to take chances with the law of averages —install an employee-protecting, money-saving goggle program* NOW!

American Optical Company offers you an entire line of comfortable goggles, each scientifically designed to meet specific types of eye hazards. Get in touch with your nearest AO Branch Office . . . or have an AO Safety Representative call.

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

$12.75

Immediate Delivery

STURTEVANT QUALITY

SPRING TESTER

Fast, Accurate and Inexpensive

Using any accurate torque wrench as its measuring element, this inexpensive spring tester measures the recoil of springs up to 7" (free length) and 2½" in diameter when compressed to any predetermined length. As easy to "set" as a vernier scale; as easy to operate as a light arbor press; and as easy to read as a school ruler—no multiple dials, no relative readings, no complicated computations. Just pull down the torque wrench handle, and take the direct reading when the built-in tone device sounds. Enables anyone to inspect, test, check or measure the recoil of springs in a few seconds . . . to accurately match sets of springs (as valve spring of engines) in a few minutes.

Widely used for testing springs in laboratories and in heat treating, inspection, assembly and repair departments to eliminate costly guesswork in building and maintaining automotive and aircraft motors. (Note: Torque Wrench NOT INCLUDED, unless specified.)

Write for Bulletin ST-5.

P. A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

Almond Drill Chuck

The Pioneer

Almond Three-Jaw Drill Chucks were Pioneers in their field — the first to be placed on the market. They have formed a necessary part in the logical procedure of machine developments over the past seventy and more years.

Almond Drill Chucks are made in types and sizes to fit all machine tools and portable drills.

Write for complete details.

T. R. ALMOND MFG. CO.

ASHBURNHAM, MASS., U. S. A.

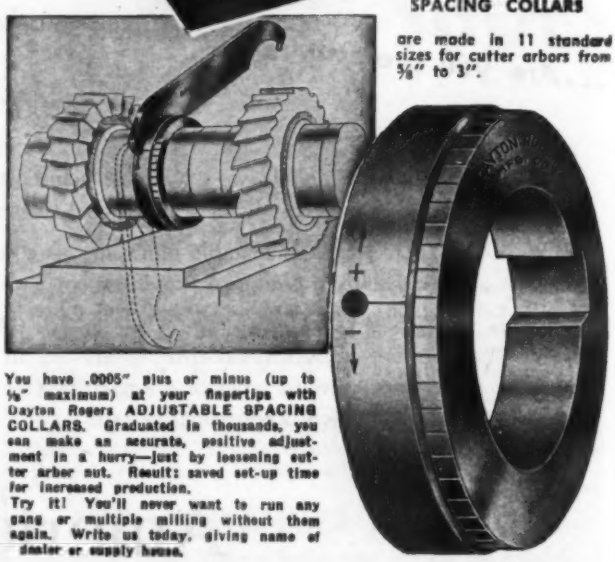
The Original Manufacturers of Drill Chucks

FAST, ACCURATE SPACING

for
SIDE MILLING CUTTERS
GANG MILLING SET-UPS

DAYTON ROGERS ADJUSTABLE SPACING COLLARS

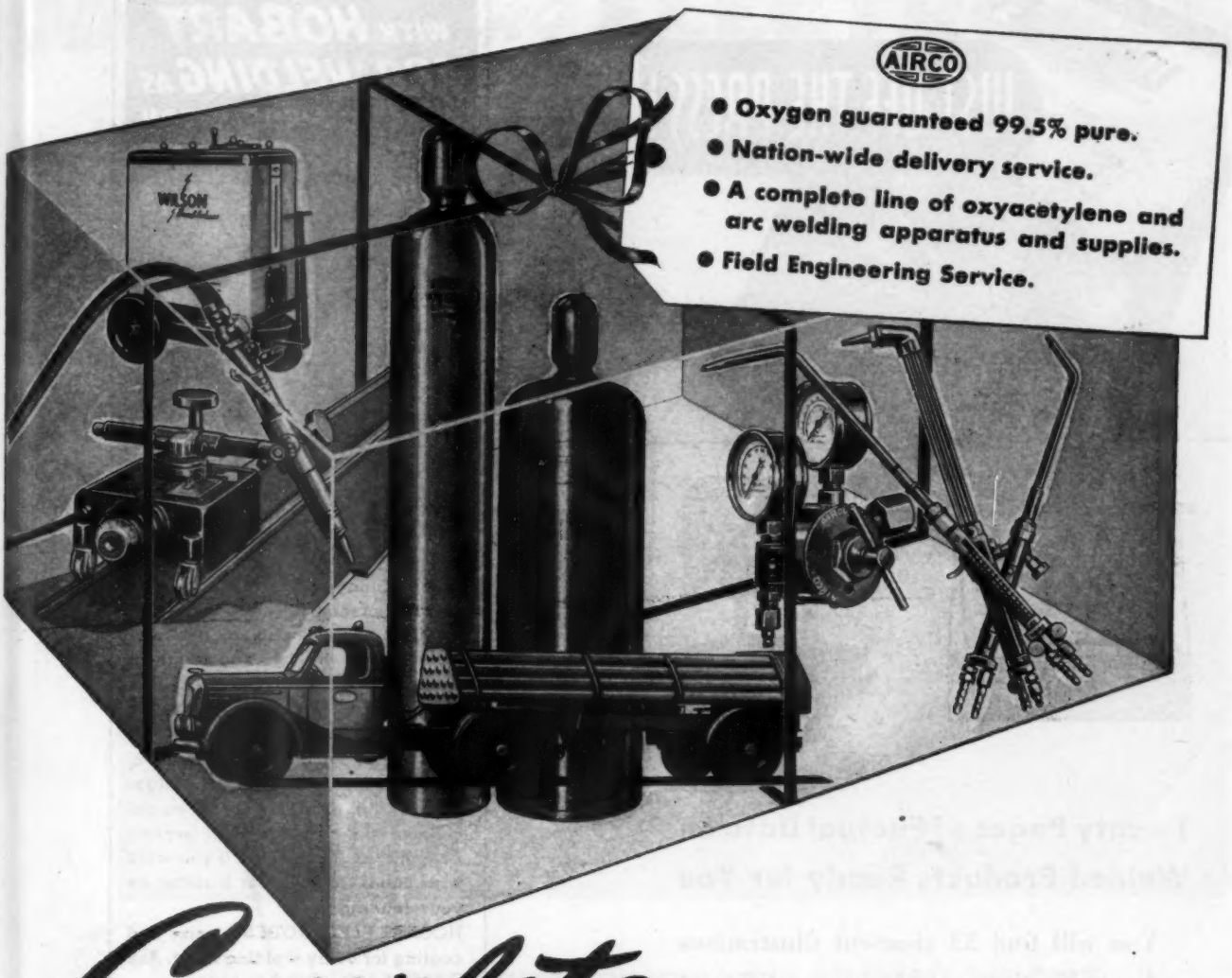
are made in 11 standard sizes for cutter arbors from ⅝" to 3".



You have .0005" plus or minus (up to ⅛" maximum) at your fingertips with Dayton Rogers ADJUSTABLE SPACING COLLARS. Graduated in thousands, you can make an accurate, positive adjustment in a hurry—just by loosening cutter arbor nut. Result: saved set-up time for increased production.
Try it! You'll never want to run any gang or multiple milling without them again. Write us today, giving name of dealer or supply house.

DAYTON ROGERS MFG. CO.

2839 12th Ave. So.
Minneapolis, Minn.


AIRCO
• Oxygen guaranteed 99.5% pure.
• Nation-wide delivery service.
• A complete line of oxyacetylene and arc welding apparatus and supplies.
• Field Engineering Service.
WILSON

A *Complete* OXYGEN SERVICE IN ONE PACKAGE...

Whether your needs are for 122 cu. ft. — 20,000—or several million cubic feet of oxygen monthly, Air Reduction's complete service meets all your oxygen needs.

Airco oxygen is guaranteed 99.5% pure . . . uniform from coast to coast. It assures maximum speed and economy in metal cutting . . . promotes greater efficiency in welding. Airco's nation-wide network of offices and plants assures dependable deliveries to any point in the nation.

Air Reduction also manufactures a complete line of apparatus and supplies for welding, cutting and all other applications of the oxyacetylene flame and electric arc. In addition, its nation-wide Field Engineering Service offers technical aid — including development of mechanical flame and arc applications and design of gas pipeline systems for your plant.

Whatever your need for oxyacetylene welding and cutting, Air Reduction's complete service will meet all your requirements. There's an Air Reduction office located within close reach of your plant.

★ BUY UNITED STATES WAR BONDS ★

AIRCO WILSON

AIR REDUCTION

General Offices: 60 EAST 42nd STREET, NEW YORK 17, N. Y.

In Texas: MAGNOLIA AIRCO GAS PRODUCTS CO. • General Offices: HOUSTON 1, TEXAS

Offices in all Principal Cities

Twenty Pages of Factual Data on Welded Products Ready for You

You will find 33 clear-cut illustrations and specifications on the many different types of welded products made by The Youngstown Welding & Engineering Company. We hand-tailor all sizes and kinds of pickling and heat treating equipment, also welded tubing and fittings, for the Metals, Process, and Allied Industries. Our organization specializes in the fabrication of Monel, Inconel, and alloy.

If you use or intend to use pickling or heat treating baskets, crates, chains, hooks or accessories, this folder will pay you dividends. It will furnish you fresh production and profit information.

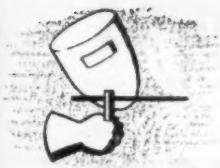
Write for your personal copy today. It will be mailed promptly.

THE YOUNGSTOWN WELDING & ENGINEERING CO.

3714 OAKWOOD AVE. YOUNGSTOWN, OHIO

WITH HOBART ARC WELDING AS A BASIC PRODUCTION TOOL...JUST WATCH OUR "QUICK-CHANGE-OVER" AFTER THE WAR.
Now — Today is the time to plan your reconversion — to decide that welding, today's outstanding production tool, will be used to fullest advantage. To help you with your plans, "Practical Design for Arc Welding," a service that shows you how to use welding in production, will be sent you FREE, no obligation. It's full of ideas, has been acclaimed the most unusual service ever offered. You need it if you work with metal, so write for it today on your letterhead.
HOBART ELECTRODES—a size and coating for every welding need. Ask for details.
HOBART BROTHERS CO.
Box AM-2-17, Troy, Ohio
Send for Catalog!
PROMPT DELIVERIES on all orders with suitable priority
HOBART
"One of the World's Largest Builders of Arc Welders"

PAGE *Welding* ELECTRODES



PAGE COATING HELPS YOU ON YOUR STAINLESS WELDING

Certainly it is important to you that **PAGE** developed a range of electrodes for welding stainless steel that is complete.

But don't overlook the important value to you of the **PAGE** coating on these electrodes—sufficiently heavy to provide the shield necessary to prevent oxidation; to provide the protection of easily removed slag that permits more cooling time; that eliminates surface checking, and that holds spatter loss to a minimum.

PAGE ALLEGHENY STAINLESS STEEL ELECTRODES provide the metal you want, help you get it where you want it and protect the job your men do. Ask your local **PAGE** Distributor.

PAGE STEEL AND WIRE DIVISION

Monessen, Pa., Atlanta, Chicago, Denver, Los Angeles, New York, Pittsburgh, Portland, San Francisco

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT · CONNECTICUT

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists; Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

C-F POSITIONERS

SAFETY, ECONOMY, SPEED *PLUS* BETTER WELDING!

A weldment can be no stronger than its weakest weld — and "down-hand" welding is your best assurance of strong flawless welds. That's why "positioned welded" is so frequently specified today!

C-F Positioners eliminate crews with slings and chains, clear your floor space, reduce accidents and *make every weld a faster, better weld!* The 135° *beyond horizontal* tilting feature of C-F Positioners combined with 360° table turn *assures* the proper welding position in even the most inaccessible corners!

Adaptable too! Heat treating, cutting, large pipe and boiler-handling problems and jobs where a continuous turn is necessary, are easily answered with a C-F Positioner. *You'll find new uses!* Many sizes and true-rated capacities. Hand or power operated. Write for catalog showing sizes, installations and many uses.

Write for Bulletin WP-22

CULLEN-FRIESTEDT CO.
1313 S. Kilbourn Ave., Chicago 23, U.S.A.

LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

WAR BONDS
are
WAR WEAPONS

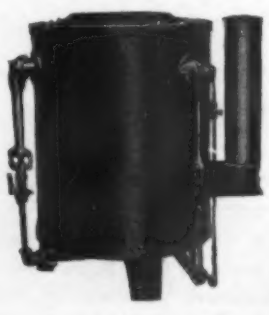
★ ★ ★ ★

Invest to the limit!

Write for Bulletin

STEVENS MILLING MACHINE VISES
5 in., 6 in. and 7 in. sizes
All parts Interchangeable
JOHN B. STEVENS INC.
474 Canal St., New York 13, N. Y.

Atmospheric Pot Hardening Furnace



"BUZZER" HIGH SPEED *Gas* FURNACES

. . . are the efficient, economical answer to today's Heat Treating Problems. *NO BLOWER or OTHER AUXILIARY POWER are needed . . . just connect to your gas supply.*

- The Full Muffle Furnace attains a temperature of 2400° F., and The Pot Hardening Furnace, tangentially fired to assure even heat up 1650° F., are two of many models available.
- Send for the new "BUZZER" Catalog showing full line of Industrial Gas Furnaces, Burners and other equipment.

CHARLES A. HONES, INC.
121 So. Grand Ave. Baldwin, L. I., N. Y.

Full Muffle Furnace

Which Ozalid machine was designed for your drafting room?

A Model B . . . Like Grumman's
Grumman Aircraft Engineering Corp.
Bethpage, Long Island, New York

A Model F . . . Like Blaw-Knox's
Blaw-Knox Corporation
Pittsburgh, Pennsylvania

A Type 2600 . . . Like Standard Oil's
Standard Oil Company of New Jersey
Elizabeth, New Jersey

1. For large-scale print production. An Ozalid Model B will turn out whiteprints of your engineering drawings at speeds up to 20 feet per minute. Printing and Dry Developing are done in one continuous operation . . . and there are many exclusive features.

It can be relied upon for dependable and economical round-the-clock performance. *Price $2,850.00 F.O.B. Johnson City, New York.*

2. For medium production. The Model F is ideal when demands are moderate or occasional. It may also be used to supplement other equipment, or provide on-the-spot printmaking in departmentalized organizations.

The printer and developer are combined in one compact unit and whiteprints can be turned out at speeds up to 4 feet per minute. *Price $825.00 F.O.B. Johnson City, New York.*

3. For use with your present printer. If you have already installed expensive blueprinting equipment . . . you can add a Type 2600 Dry Developing unit and receive all the benefits of Ozalid Printmaking.

Expose Ozalid sensitized materials in your printer—then transfer to the Type 2600. Rate of development is approximately 5 feet per minute. *Price $370.00 F.O.B. Johnson City, New York.*

YOU CAN'T HAVE THIS VERSATILITY—WITHOUT AN OZALID MACHINE

Ozalid's Dry Development distinguishes it from all other printmaking processes. It eliminates baths, driers, plumbing connections—is responsible for compact machine design.

What's most important, it allows you to use a full line of sensitized materials and obtain exclusive printmaking "extras".

WITH OZALID YOU CAN:

Make prints having blue, black, maroon lines on white backgrounds.

Produce duplicate "originals"; reclaim soiled or worn tracings; eliminate drafting waste when making corrections.

Use cut sheets as well as roll stock—eliminate trimming waste.

Turn out all prints in the same manner. No variations in production.

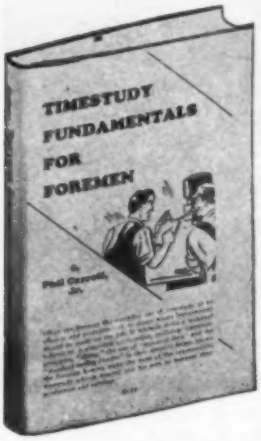
WRITE FOR CATALOG AND SAMPLES OF OZALID WHITEPRINTS.

OZALID PRODUCTS DIVISION

GENERAL ANILINE AND FILM CORPORATION

JOHNSON CITY, N. Y. ★ OZALID IN CANADA—HUGHES OWENS CO., LTD., MONTREAL

An ABC book of timestudy to help you get bigger output



Stressing exactly the problems the foreman encounters in making a timestudy and in applying new, improved standards, this straightforward manual shows just how to go about making the study, tells what to do in order to get the most out of the study, in bigger and better output and in improved working methods.

Just Published

TIMESTUDY FUNDAMENTALS FOR FOREMEN

By PHIL CARROLL, JR.

Management Consultant

172 pages, 4¾ x 7⅜, $1.75

Here are the same methods used by up-and-coming modern industries—the same procedures condensed and simplified and brought by a timestudy expert to the man who wants to get more production on a down-to-earth practical scientific basis.

- **The book covers the essentials with a minimum of the higher, engineering aspects.**
- **Wage incentive plans are covered in one chapter, to show the end result of timestudy, and these are explained in terms of fundamentals and without mathematics and system names as such.**
- **Much emphasis is laid on the necessity for proper "rating" of the effort made during the timestudy—rating receiving unusual attention in current meetings, committee study and periodicals.**
- **Considerable attention is given to taking the foreman step by step through the standard-setting process by means of standard data curves, charts, and tables, in their simplest forms.**

Chapters

1. What Timestudy Gives to Industry
2. Why Foremen Should Understand Timestudy
3. How to Begin a Timestudy
4. Looking at the Job Details
5. How Long Does It Take?
6. How Long Should It Take?
7. How to Set Consistent Element Times
8. What Job Details Repeat?
9. How to Set Standards
10. Be Sure to Explain Timestudy
11. Incentive Plans Explained
12. You Can Improve Methods
13. How Your Job Changes
14. Are You Looking Ahead?

SEE IT 10 DAYS ON APPROVAL

McGRAW-HILL ON-APPROVAL COUPON

McGRAW-HILL BOOK CO., INC.
330 W. 42nd St., New York 18, N. Y.

Send me Carroll's TIMESTUDY FUNDAMENTALS FOR FOREMEN for 10 days' examination on approval. In 10 days I will send $1.75 plus few cents postage or return book postpaid. (Postage paid on cash orders.)

Name .....

Address .....

City and State .....

Position .....

Company ..... A. 2-17-44

(Books sent on approval in U.S. and Canada only.)

LIGHT ON CRITICAL "SEEING" PROBLEMS

Question —

How much light does a workman need for maximum seeing and work efficiency?

Answer —

The quantity and quality of light needed varies with each worker's task. In general, rough work seeing needs 20 footcandles, medium work seeing 30-50 footcandles, fine work seeing 50-100 footcandles, and extra fine work seeing over 100 footcandles, as specified by American Recommended Practice of Industrial Lighting.

Question —

How can this wide variation in worker lighting needs be provided for in a factory lighting system?

Answer —

Through Balanced Lighting. Lighting levels over 50 footcandles can be obtained efficiently and economically only by a combination of Localized lighting of needed high level directly on the individual work area, and General lighting for overall work-area surroundings. Applied in the proper ratio, usually 5 to 1, the combination becomes Balanced lighting.

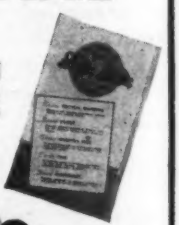
Question —

Who should survey our plant lighting needs?

Answer —

Put your illumination problems in the hands of qualified specialists. Fostoria Industrial Service Centers, located in principal cities, are nationally recognized specialists in Industrial Lighting for Seeing. Their study and counsel on your lighting problems are available to you without obligation.

REQUEST THIS *free* BOOKLET TODAY!
Explains the efficient and economical results of "Balanced Lighting" and how to obtain it. Ask for BL-3-AM.



BALANCED LIGHTING fostoria
GENERALITES for Overall Lighting • LOCALITES for Light ON the Job
Trade Mark Reg. U. S. Pat. Off.

FOSTORIA INDUSTRIAL SERVICE
Factory and General Offices FOSTORIA, OHIO
In Canada—Write Amalgamated Electric Corp., Ltd., Toronto

"Boys, let's put our heads together and see how much paper and paper board we can save!"

THAT'S the spirit. That's what we've all got to do to lick this problem of getting enough paper and paper board for Army and war-production use.

Every company has got to organize a Paper Conservation Committee and tackle the problem with all the gumption and the brain power at their command.

Paper inventories must be checked with the idea of eliminating peacetime extras. From stationery to board containers, every paper item must be examined to see in what way each company can use less paper.

Functional packaging must be the order of the day.

Sure, you have followed all the government directives on the subject. Even made cuts of your own. But, frankly, that isn't enough. Every time another ship leaves an American port loaded with paper-wrapped war supplies, the problem becomes tougher.

And it's up to you to join with the rest of industry to lick it. The War Advertising Council and the War Production Board have prepared a brief list of suggestions to help you. But you know your own business. You know how you can use less paper. ***It's up to YOU!***

TO GET MORE PAPER FOR . . .	USE LESS PAPER THESE WAYS
Blueprints for battleships	Eliminate slack fills.
"K" ration containers	Increase units per case to the maximum practical.
Signal Corps radio sets	Reduce separators to shoulder height.
Containers for shells	Eliminate carton liners if possible.
Gas mask canisters	Eliminate individual cartons wherever possible.
Disposable gun covers	Reduce weight of containers whenever compatible with safety.
V-mail envelopes	Do away with all unnecessary overlapping.
Blood plasma boxes	Set up a Paper Conservation Board in your plant.

This advertisement prepared under the auspices of the War Advertising Council in co-operation with the Office of War Information and the War Production Board.

Let's All Use Less Paper

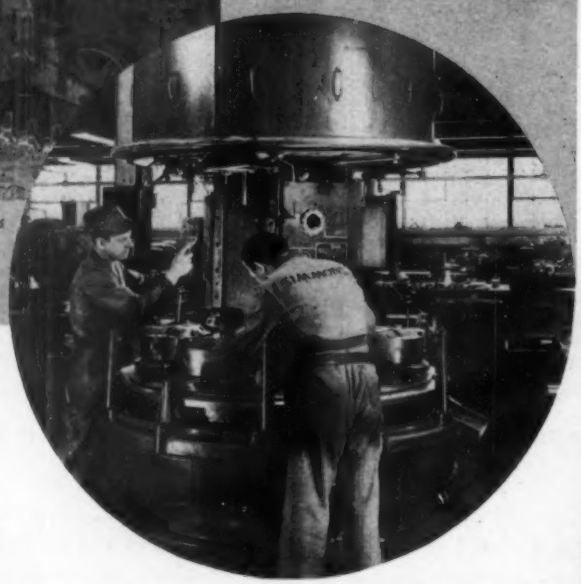
Space for this advertisement contributed by American Machinist

. . . REBUILDING . . .

WAR wears 'em down!

Photo by U. S. Army Signal Corps

machine tools, like tanks, need time out for repairs



The balance in battle often hangs on the ability to return damaged weapons to action faster than the enemy.

This war's battles start on your production lines. Machine tools are your weapons. Operated twenty-four hours a day, often in semi-skilled hands, they undergo punishing wear and tear. As a result, they can develop more troubles in a single year of intensive day-and-night shifts than in a decade of normal production.

Because replacement of these vital weapons is both difficult and time-consuming, you have a two-fold responsibility: to keep your machine tools at peak efficiency by preventive maintenance and to repair them speedily when they do break down.

Simmons, specialists in rejuvenating metal-working equipment, has returned to production many hundreds of used machine tools of all types and sizes. Send *your* maintenance or rebuilding problem "behind the lines" to Simmons. This company has the facilities and experience to solve it for you quickly. Ask for full details on "The Simmons Way."

KEEP 'EM RUNNING!

Every machine listed in this column is in our warehouse at press time.

- 4⅝ Bar, N.B.P. Horizontal Boring Mill, Knee Type, 30″x90″ table, M.D.
- ‡O FOSDICK Horizontal Boring, Drilling & Milling Machine, M.D.
- ROCKFORD Horizontal Drilling & Boring Machine 3⅜″ spindle
- 4′ HAMMOND Hi-Speed Sensitive Radial Drill, M.D.
- 33″ x 9″ GOULD & EBERHARDT Spur Gear Cutter
- 90″ PRATT-WHITNEY Spur Gear Cutter
- 15″ GLEASON Bevel Gear Generator
- 16″x5′ PRENTICE Portable G.H. Lathe
- 42″ PUTNAM Double End Car Wheel Lathe, M.D.
- ‡1 N.B.P. Car Wheel Lathe
- ‡3-B MILWAUKEE Plain Miller
- ‡2 CLEVELAND Plain Miller
- ‡10 NILES Vertical Milling Machines
- ‡6 BECKER Vertical Milling Machine
- 30″x30″x10′ NEWTON Slab Miller
- 12″ Wm. SELLERS Slotters
- 20″ SELLERS Crank Slotter, M.D.
- 12″x12″ ACME Power Hack Saw, M.D.
- 48″x48″x24′ N.B.P. Heavy Planer, Two Rail, One Side Head, M.D.
- 48″x48″x20′ PATCH Planer, 4 heads, 230 volt D.C. Rev. M.D.
- 24″x24″x6′ WHITCOMB Planer, 230 volt D.C. Reversing M.D.
- ‡3 WARNER-SWASEY Turret Lathes, 3⅛″ bar capacity
- ‡1 L&A Multiple Punch, 100 Tons, 72″ between housings
- 6″x6″⅝″ SOUTHWARK Double Angle Shear
- SCHULTZ - NAUMANN Beam Shear, 20″, 60 lb. and smaller
- 60″ Throat, 8″ x 1 1/16 LONG & ALSTATTER Shear
- 54″ Throat 1¾″x1⅛″ HILLES & JONES Punch
- 42″ Throat, 1¾″x1″ HILLES & JONES Punch, M.D.
- 4″ LANDIS Pipe Threading Machine
- 6″ BIGNALL - KEELER Duplex Pipe Machine
- 10″ STANDARD Pipe Threading Machine
- 4″ BAKER Heavy Duty Automatic Tapping Machine
- ‡O BAKER Keyseater, M.D.

SIMMONS ENGINEERED Machine Tool REBUILDING

SIMMONS MACHINE TOOL CORPORATION

Main Office and Plant: 1759 N. BROADWAY, ALBANY 1, N. Y.

New York Office: 149 BROADWAY

You CAN NOW HAVE your MACHINE REMANUFACTURED

ReMANUFACTURED
-(ORIGINATED BY US)-
MACHINE TOOLS
Reg. U.S. Patent Office

HILL-CLARKE MACHINERY CO.

651 WASHINGTON BLVD. • CHICAGO 6, ILLINOIS

CONTRACT WORK

ADDITIONAL FACILITIES FOR CONTRACT MANUFACTURING

Hand screw machines up to 1½ dia.
Turret lathes up to 15" dia.
Milling machines
Engine lathes
Bench lathes
Drill presses
DoAll contour cutting machine

RELIANCE MACHINE & MFG. CO.
30 Irving Place, New York, N. Y.
established 1922

MACHINES AND PARTS, SPECIAL TOOLS, ETC.

to your specifications

SPECIAL ENGINEERING WORK

. . . on Contract

It will pay you to investigate our facilities. As designers and builders of wire and ribbon stock forming machines we can offer you skilled and experienced assistance. Send us your blueprints or samples for prompt quotations.

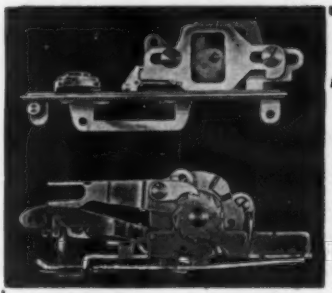
We also solicit your bids for cam milling

THE A. H. NILSON MACHINE CO. Bridgeport, Conn.

SPECIAL TUNGSTEN CARBIDE TOOL BLANKS

Any Shape, Size or Grade made to order.
10 day Service.

Adamas Carbide Corporation
40-30 23rd Street
Long Island City 1, New York



STAMPINGS and ASSEMBLIES

We can make long or short runs in any metal. Our modern equipment and methods, backed by 50 years of experience, are your guarantee of satisfaction. Our manufacturing facilities also include screw machine products, tools, dies, jigs and fixtures.

"Greater Savings with Greist"

Your order is assured of quality workmanship by skilled mechanics. We will furnish prompt quotations on your blueprints or samples. Write us today!

THE GREIST MFG. CO. 546 Blake Street New Haven, Conn.

METAL STAMPINGS
• TOOLS • DIES •
PERMANENT MAGNETS
HEAT TREATING
THOMAS & SKINNER
STEEL PRODUCTS CO.
1103 E. 23rd St. INDIANAPOLIS, IND.

TANK AND SHEET METAL WORK

We are equipped to manufacture to your specifications tank work, such as storage tanks, pressure tanks, etc. Our welders are experienced in welding steel, stainless steel, Monel metal and Everdur; also brazing of all descriptions. They are certified for welding under the ASME Code Unfired pressure vessels. We also have certified Navy Aeronautical welding under certain specifications. Send your blueprints for prompt quotations.

BOWSER, INC.
1302 E. CREIGHTON **FT. WAYNE 5, INDIANA**

WIRE AND METAL SPECIALISTS
in round, flat, square and special shaped wire in all metals.
LARGE PRODUCTION CAPACITY
Plating and finishing.
EASTERN TOOL & MFG. CO.
BLOOMFIELD, N. J.

Additional Contract Work Advertising on opposite page

GEAR BLANKS

WE CAN MAKE QUICK DELIVERY ON YOUR GEAR BLANKS

Send Us Your Prints for Quotation

PRECISION MOTORS COMPANY, 119-22 Park Place, Richmond Hill 19, N. Y.

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

10 cents a word minimum charge $2.00. (See ¶ on Box Numbers.)

POSITIONS WANTED (full or part-time individual salaried employment only), ½ above rates.

PROPOSALS. 50 cents a line an insertion.

INFORMATION:

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals.)

DISPLAYED—RATE PER INCH:

The advertising rate is $6.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page. A.M.

NEW ADVERTISEMENTS received by 10 A. M., February 11th will appear in the issue of March 2nd subject to limitations of space available

POSITIONS VACANT

These Positions Vacant advertisements are published subject to agreement by the advertisers not to consider applicants now employed on war work unless they obtain written release from present employer.

MECHANICAL DRAFTSMAN with practical mechanical experience in blanking, drawing and forming dies for sheet aluminum products in defense work by old established company in Central West; give experience and full particulars. P-667, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

TOOL MAKERS for defense plant in Central West; give experience and full particulars. P-668, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

POSITIONS VACANT

3 FIRST CLASS MACHINE TOOL DESIGNERS wanted with experience on medium and heavy machine tool design. Company now working on War work. The work will however continue through Post War Period. Position can be considered permanent. Location Southern Ohio. P-737, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

SUPERINTENDENT of Modern Production Machine shop. Must be first class machine mechanic, know screw machine tooling, modern precision grinding methods, heat treating, precision inspection, have a dynamic personality with a successful background, and able to train and handle workmen. Interested only in man seeking permanent connection. Age preference—45 to 50 years. P-758, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED — TOOLMAKER

who has had enough experience to take charge of tool room on special machine tools, jigs, fixtures, and gages, for our own plant. Excellent post-war opportunity for man who desires to get connected with a progressive concern established in 1933. Factory located on beautiful Lake Shore Drive, in southwestern Michigan. Give all details and salary expected in first letter.

P-701, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

POSITIONS VACANT

MECHANICAL DRAFTSMAN familiar with code designs for pressure vessels and refinery piping. Knowledge of machine design desirable. Not a duration job. Magnolia Petroleum Company near Dallas. Give details of experience and availability. Persons now employed in essential industry must have statement of availability. P-766, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

EMPLOYMENT SERVICE

SALARIED POSITIONS—This advertising service of 34 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details. R. W. Bixby, Inc., 266 Delaware Bldg., Buffalo, N. Y.

POSITIONS WANTED

WORKS MANAGER or Superintendent. Practical and technical with business and industrial engineering experience; experienced in supervising tooling and production on small and medium interchangeable parts. PW-761, American Machinist, 330 W. 42nd St., New York 18, N. Y.

MASTER MECHANIC or Shop Foreman. Position wanted U. S. or Foreign service; married, no children, 18 years all around machine shop experience, as machinist, toolmaker, apprentice teacher shop foreman, 2 years I.C.S. Mechanical Engineering, available on 3 weeks notice. 233 Gardner, Vallejo, Calif.

SELLING OPPORTUNITIES
OFFERED—WANTED
Selling Agencies—Sales Executives
Salesmen—Additional Lines

WANTED

ENGLISH IMPORTER of machine tools, agricultural machinery and similar products with extensive selling organization and manufacturing facilities for articles outlined above and also factory suitable for production of household or similar mass produced small machinery desires to acquire sole selling or manufacturing rights for articles of above or similar nature. Representative will be available USA February to April. Apply RA-767, American Machinist, 330 W. 42nd St., New York 18, N. Y.

Continued on page 324

WANTED: MANUFACTURERS' REPRESENTATIVE

A number of territories open to sell on commission basis outstanding Machine Tool Accessory line also a Flexible Coupling of exceptional merit. Write giving full details as to present connections and past experiences. All correspondence kept confidential.

RW-759, AMERICAN MACHINIST
330 West 42nd Street New York 18, N. Y.

CONTRACT WORK

(Continued from opposite page)

• QUALITY •
SCREW MACHINE PRODUCTS
• ● •
WALTHAM
SCREW COMPANY
WALTHAM • MASS.

• TOOL DESIGNING AND BUILDING • MACHINES DESIGNED • IDEAS DEVELOPED • PROMPT—EFFICIENT—SERVICE • • REASONABLE CHARGES •

OLD COLONY ENGINEERING CO.
180 Weeden St. • Pawtucket, R. I.
P.O. Box 672 • Tel. Blackstone 2610
Write — Phone or Telegraph

MACHINE SHOP WANTS DEFENSE WORK

Lathes, Milling Machines, Drill Presses, Riveting, Hot Dip Tinning, Jigs and Fixtures. Investigate TODAY.

STEPHEN J. LEWIS ENGINEERING CO.
215 Butler St. TRiangle 5-5348 Brooklyn, N. Y.

MACHINE SHOP

Facilities include 9" South Bend Bench Lathe, 2 Brown & Sharpe Milling Machine, Drill Press and 8" x 8" Shaper. The usual line of hand tools and equipment plus experienced workmanship assure your satisfaction. Your inquiries invited.
C. VANDEGRIFT CO., HOCKESSIN, DELA.

Gray Iron and Semi Steel Castings, also alloyed with nickel, chrome, and molybdenum. Wood, Iron, Brass and Aluminum pattern work.

KING FOUNDRIES, INC.
Phone 328 North Wales, Montg. Co., Pa.
22 Miles from Philadelphia, Pennsylvania

PRECISION FORM GRINDING

Specialists in grinding Circular and Flat FORM-TOOLS, FORM Counterbores, FORM Flat-Drills, and related types of FORM grinding. Also stepgrinding of Tungsten and Molybdenum Rods.

Send Prints for Quotation and Delivery
J. & S. TOOL CO.—477 Main St.—E. Orange, N.J.
(Makers of J.&S. Radii & Angle Dressing Tools)

Put Your Idle Capacity to Work

Hundreds of metal-working companies are finding profitable business today outside their regular lines. Tell metal-working America—the 100,000 readers of American Machinist—about your facilities. Write for rates.

CONTRACT WORK DEPARTMENT
AMERICAN MACHINIST
330 W. 42nd St., N. Y. 18, N. Y.

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us—we will take care of them.
GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

IMPORTANT LIQUIDATION

MOST OF THE EQUIPMENT AT

E. J. MANVILLE MACHINE CO. INC.

HAMILTON AVENUE AND EAST MAIN STREET

WATERBURY, CONN.

Avail Yourselves of These "Buys"

Niles-Bement-Pond 96" x 69" x 15' Planer; 4 heads; box table; variable speed M.D.

GRAY 60"x60"x14' Planer; 3 heads

Niles-Bement-Pond 48" x 36" x 14' Planer; 3 heads

GRAY 24"x24"x6' Planer; 1 head

CINCINNATI No. 3 Vertical Miller; dial feed; Timken bearing

Kearney & Trecker No. 2B & No. 3B Plain Millers

TAYLOR & FENN Spline Miller, M.D.

CINCINNATI BICKFORD 4' x 6' Pl. Radial Drills

HENDEY 18" x 8' & 20" x 8' Engine Lathes

CRANES—from 5 to 20 ton capacity
TOOLROOM EQUIPMENT—such as Drills, Reamers, Milling Cutters, etc.
RAW MATERIALS—Steel, Lumber and many other items

BRADFORD 42" x 16' Engine Lathe

BLANCHARD No. 16A Rotary Surface Grinder; M.D.

NORTON 15" x 15" x 72" Surface Grinder; M.D.

NORTON 14" x 72" Plain Grinder

CINCINNATI No. 1½ Universal Grinder

LUCAS No. 1, 3" bar. Horiz. Boring Mill; M.D.

LUCAS No. 3, 3½" bar Horiz. Boring Mill; M.D.

PARTIAL LIST—50 Other Machine Tools Available. INVESTIGATE—Ask for Details.

72" x 48" x 24' Gray Planer—two hds. on rail reversing motor drive

3" bar Universal Horizontal Boring Machine

36" x 36" x 8' Cincinnati Planer—one head — arranged constant speed motor drive

18" Libby Turret Lathe—4¼" hole

4-spindle Henry & Wright Ball Bearing Drills (11)

24" x 36" x 10' Ingersoll Horizontal Spindle Slab Milling Machine

24" x 24" x 14' Ingersoll Adjustable Rail Miller one vertical head

32" x 37½ x 12' Ingersoll Adjustable Rail Miller two vertical heads

HILL-CLARKE MACHINERY COMPANY

Chicago 6, Illinois

651 Washington Boulevard

SELECTIONS FROM MILES' STOCK

Automatic, 7" Baird 6 spindle
Automatic, 4½" Gridley Model H 4 spindle
Automatic, 1⅝" National Acme 4 spindle
Automatic, 1¾" New Britain 6 spindle
Automatic, 14" x 19" Fay
Boring Mill, 3" bar, No. 3-A Universal
Boring Mill, 3⅞" Beaman & Smith cylinder
Brake, 10' x 10 ga. Dreis & Krump leaf
Broach, No. 3 double & No. 4 Lapointe
Broach, 2 ton American vert. hydraulic
Compressor, 427 Cu. Ft. Chicago steam
Compressor, 550 Cu. Ft. National, elec.
Compressor, 1400 Cu. Ft. Sullivan, elec.
Drill, Multiple, Nos. 11, 12 & 13 Natco
Drill, Sensitive, 2B Edlund, 1, 2 & 4 spindle
Drill, Sensitive, No. 2 Henry Wright, 1 & 2 spindle
Drill, Sensitive, 30" Henry & Wright No. 3
Gear Shaper No. Z1 Fellows (large hole)
Gear Hobber, No. 16 HS Gould & Eberhardt
Gear Hobber, No. 1 Lees Bradner
Gear Cutter, 26", & 48 Brown & Sharpe
Gear Lapper, 8" Red Ring
Gear Generator, 18" Gleason bevel gear and bevel pinion
Gear Tester & Lapper, 18" Gleason
Gear Chamferer, No. 4 Peerless
Grinder, 12' x 48" Cincinnati No. 3 Univ.
Grinder, 23", No. 84 Gardner opposed disc
Grinder, 20' Gardner semi-auto. disc
Grinder, No. 72 Heald electric indicator automatic internal
Grinder, Nos. 50 & 60 Heald cylinder
Grinder, 24' Cincinnati milling cutter
Grinder, 16" x 48" Landis crankshaft
Grinder, No. 3 Cincinnati centerless
Grinder, 12" x 36", 16" x 36" & 16 x 52 Landis
Lathe, 18" x 8' Greaves Klusman QCG
Lathe, 36" x 16' Putnam grd hd, QCG
Lathe, 8" Sundstrand stub
Lathe, 4" x 36" Lo Swing
Lathe, 1" x 18" Pratt & Whitney automatic
Lathe, 14" Porter Cable
Lathe, Turret, 22" Libby, 4⅛" hole
Late, Turret, 26" Libby, 4½" hole
Lathe, Turret, 26" Libby, 7⅛" hole
Lathe, Turret, No. 3B Foster, 5⅛" hole
Lathe, Turret, Nos. 4 & 6 Warner & Swasey
Miller, No. 3 Van Norman duplex
Miller, 30" Newton continuous rotary
Miller, Nos. 10 & 45 Productomatic
Miller, No. 3 Turnmillers
Miller, 48" Oesterlein tilted offset
Miller, No. 1 Davis Thompson Duplex
Planer, 24" x 24" x 5' Gray
Planer, 36" x 36" x 16' Cleveland openside
Press, No. PG5 Ferracute punching
Press, No. 53 Toledo straight side
Press, 150 ton V.K. & V. coining
Press, No. 796¾-D Toledo Dbl. Cr. toggle
Press, 28", No. 71 Swaine double crank
Press, No. 174 Consolidated gap double crank, roll feed
Press, No. 33 Consolidated arch frame
Press, No. 2 Standard screw type
Press, 8 ton No. 83 General Flexible
Press, Nos. 1 & 6 Toledo OBI
Press, 49", No. SG84 Ferracute dbl. crank
Roll, No. 1 Ajax forging
Roll, No. H60 Yoder crown fender
Saw, Cold, 4", 7" & 8" Higley
Saw, Cold, 36" Newton
Shaper, 16" Milwaukee
Shaper, 28" Lynd Farquhar openside
Shaper, 36" Morton draw cut
Shear, 8" x 8" x 1" L. & A. double angle
Shear, 1½" Lewis alligator
Slotter, 4" Garvin
Swager, No. 6 HS Langelier
Upsetter, 4" Ajax, suspended slides
Welder, 375 KVA Fisher Body press

SEND FOR COMPLETE STOCK LIST

MILES MACHINERY CO., SAGINAW, MICH.

NEW HAVEN 38" x 22' Heavy Duty, Triple Geared, Internal Geared Faceplate Drive ENGINE LATHE, A.C. Motor Drive.
NILES-BEMENT-POND Horizontal Boring, Drilling & Milling Machine, 4½" bar, Duplex Control, Table Type, with Auxiliary Table, M.D.

ALSO MANY OTHER TOOLS

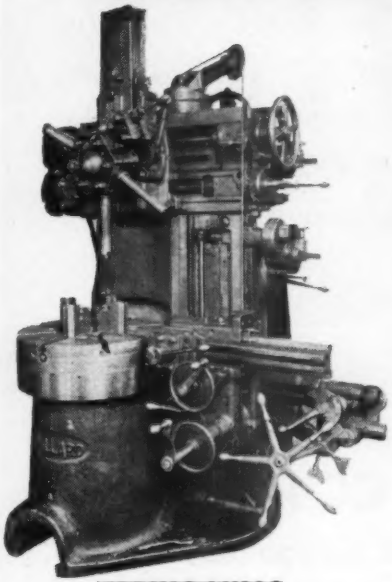
ALEX ZEEVE & COMPANY
2269 Woolworth Building New York, N. Y.

Before you buy, sell or exchange machinery of any kind contact us first

PAUL'S MOTOR & MACHINERY SUPPLY
6111 Vermont Ave.
DETROIT, MICH.

IMMEDIATE DELIVERY

"FALK" for DEPENDABILITY in Rebuilt Machinery



BORING MILLS

24" BULLARD RAPID PRODUCTION; Serial 6620—Vertical Turret Lathe with Side Head, Motor Driven, 3-60-220. Complete. Reconditioned—Immediate Delivery.

3½" Bar, Landis, Floor Type; Floor Plate 120"x72"; Range—60" Longitudinal Travel, 60" Vertical Travel, 26" Spindle Travel at one Setting.

MILLING MACHINES

No. 3 Cincinnati Vertical High Power Miller, Motor Driven; Power Rapid Traverse, Serial A 308-E; Range 34" Longitudinal Travel, 12" Transverse, 20" Vertical; Thoroughly reconditioned; immediate delivery.

AMES Precision Universal Bench Mill.

#2-B Plain Kearney & Trecker Milwaukee Mill. Motor in base.

No. 1 Kempsmith Universal Mill

No. 4 Brown & Sharpe high power plain Miller, single pulley drive

No. 1 Cleveland Vertical Miller.

No. 2 Pratt & Whitney Duplex Production Miller, Belt drive and countershaft.

No. 1 U. S. Hand Miller, motor driven.

No. 12 Pratt & Whitney Profiler.

No. 1¼ Valley City Plain Miller, belt drive.

PRATT & WHITNEY 2" Spline Duplex Miller

1—No. 4 Cincinnati Plain Miller, high power, Serial #A-703-D.

HEAVY PRODUCTION FOLDER NIAGARA #98

6' x 14 gauge capacity. Ar. M.D.

Working length 72", cap. 14 gauge; min. width of fold at cap. 1" gaging range (narrow folds) ⅜" to 1⅝", max. gaging range 72" left of chamfering bar 3". Shipping wt. 12,690 lbs. Like new.

HAMMERS

High Speed Riveting Hammers, all sizes in stock from 6 A to AA 1.

1100 lb. Niles Steam Forging Hammer.

50 lb. Fairbanks Blacksmith Forging.

15 lb. Bradley upright strap Hammer.

GRINDERS

#4 Gallmeyer & Livingston Universal Tool and Cutter Grinder. Motor Drive with Wet Attachment.

#2 Cincinnati Centerless Grinder

24" x 136" Landis Universal Cylindrical Grinder, motor drive, perfect condition, rare bargain.

Pratt & Whitney 14" x 36" Vertical Surface Grinder, ball bearing spindles, belted motor drive, 10" x 36" magnetic chuck.

No. 2 and No. 3 Brown & Sharpe Cutter Grinder.

#2 Brown & Sharpe Universal Cylindrical, belt drive.

18" Gordon Disc Grinder, double end, B.D.

12" x 2" New B-line Floor Grinders, 3 H.P., 3-60-220/440.

24" Landis Universal Cylindrical Grinder (as illustrated foot of next column).

GEAR CUTTING MACHINERY

No. 13 Brown & Sharpe Spur & Bevel Gear Cutter.

No. 612 Fellows Gear Shapers, large hole in spindle. Exceptionally fine condition.

PLANERS

POND 72" x 72" x 18' table; 2 heads on rail, 2 side heads.

CINCINNATI 30" x 30" x 10' table, M.D.

PUTNAM 48" x 48" x 12' table, M.D.

Gray 26" x 26" x 8' Double Housing Planer, single head on cross rail, belted motor drive.

Cincinnati 24" x 24" x 6' table, belt drive, single graduated swivel head on cross rail.

American, 30" x 30" x 12', A.C. Motor Drive, two heads.

Betts Planer, 120" between uprights, 72" under rail, 35' table. Equipped with four heads and arranged direct motor drive with D.C. 50 H.P. reversing type motor and controller. Perfect condition. Immediate delivery.

120" x 3/16" NIAGARA SHEAR

Niagara Model 10E 10'x3/16" Power Shear. 18" gap. Frame arranged for Motor Drive. Prompt Delivery. Shipment from Cincinnati.

#4 Waterbury Bolt Trimmer. Capacity ¾"x 8" with Hopper Feed and Motor Drive.

DAVENPORT AUTOMATIC SCREW MACHINE

Model B High Speed. 5 Spindle 9/16 round capacity. With Threading Attachment.

LANDIS UNIVERSAL CYLINDRICAL GRINDER

Size 24" swing x 136" between centers. Motorized, motors, 3 phase 60 cycle 220-440 Volt. Complete with Tank and Pump. Warranted in first class mechanical condition. Will hold long work to very close tolerances. BARGAIN PRICE. Immediate delivery.

LATHES

LeBlond 21 x 10 Quick Change Gear Lathe, motorized.

Rockford 16 x 6 Quick Change Gear, motorized.

LeBlond 14" x 6' Toolroom Quick Change Gear Screw Cutting Lathe with taper attachment, drawbar collets and two chucks.

American 16 x 8 Quick Change Gear, motor drive.

Seneca Falls 14 x 6 Quick Change Gear, motor drive, taper attachment, collets.

Reed-Prentice 20" x 10' Quick Change Gear, motor drive, taper attachment.

Logan Model #450 Turret Lathe, new, ⅝ capacity, immediate delivery.

26" x 12' PUTNAM Heavy Duty, Quick Change Gears, fitted with Raising Blocks to swing 32"; Arranged for direct Geared Motor Drive.

22" x 16' REED "Light Pattern" Plain Change Screw Cutting Lathe, fitted with 12" 4-jaw chuck, standard equipment. $550.00.

21" x 16' LeBlond, Heavy Duty Quick Change Gear Screw Cutting Lathe, Motorized 3-60-220, Oil Pan, Taper Attachment, Pump, Chuck and Standard Equipment, Rebuilt, Immediate Delivery.

21" x 8' LeBlond Heavy Duty Geared Head motor driven Screw Cutting, Quick Change Gear, Engine Lathe, with taper attachment, 18" 4-jaw Independent Chuck, standard equipment. Motor Dr.

Monarch 16" x 8' Quick Change Gear Bowl Head, 3 step cone, double back geared with two chucks, taper attachment, standard equipment.

16" x 6' South Bend Plain Change Lathe, 4-step cone, belt drive, standard equipment.

Fitchburg, LoSwing Lathes 8" x 108". Late type.

10' x 42" Logan New Lathes. $225.00.

18" x 10' bed Rahn-Carpenter Plain Change Gear Screw Cutting Lathe. Fitted with 12" 4-jaw Independent chuck, recently reconditioned. PRICE: $850.00. Shipment from Worcester, Mass.

Buy From Stock

MACHINERY

Tel. Main 6347-6348

FALK

MACHINERY CO.,

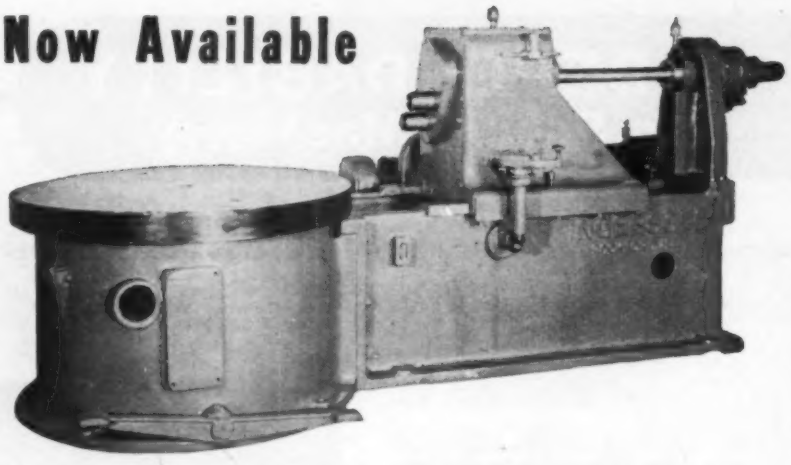
18 WARD ST.

MERCHANTS

ROCHESTER 5, N.Y.

INGERSOLL HYDRAULIC DRILL

Now Available



Head equipped with 2 spindles. Diameters of spindles, 3" and 2⅜". Centers of spindles to table, 7½" and 10¾". Horizontal travel of head, 16". Equipped with 48" rotary indexing table. With 7½ H.P. motor and oilgear-pump.

These machines are well adapted for drilling and boring operations where it is necessary to use a fixture mounted on an indexing table. Located for immediate inspection at our Chicago warehouse.

EMERMAN MACHINERY CORP.

875 W. 120th Street **Chicago 43, Illinois**

LATHES

36" x 30' LeBlond Grd. Hd. A.C. M.D.
26" x 14' Putnam Heavy Duty A.C. M.D.
24" x 12' Niles Heavy Duty, Q.C.

GRINDERS

#16 10" x 72" Brown & Sharpe Plain.
Fitchburg Spline Shaft Grinder.
Lees Bradner Gear Grinder.
Simplicity Piston Grinder.

GEAR MACHINERY

18" Gleason Bevel Gear Generators.
6" Bilgram Bevel Gear Generator.
#4—36" B & S Automatic Gear Cutter.
Lees Bradner Gear Grinder.

PLANERS

42" x 42" x 20' Cincinnati Hypro 4 Heads, D.C. drive.
72" x 60" x 28' Pond 2 heads, Belt drive.
24" x 24" x 6' Gray Planer.
26" x 26" x 8' Woodward & Powell, 2 Hds.

RADIAL DRILLS

2½' American Plain, M.D.
3' American Sensitive.
3' American Plain.
3' Cincinnati Bickford Plain Radial Drill.
4' Carlton Plain Radial Drill.
5' Cincinnati Bickford M.D.

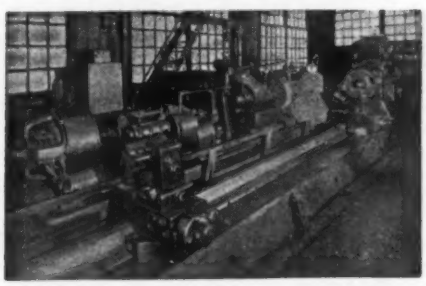
MISCELLANEOUS

#3 GH LeBlond Plain Heavy Duty, PR.
14" Niles Slotter.
1500# Bell Steam Hammer.
#4 Cincinnati Vert. High Power Mill, M.D.

CINCINNATI MACHINERY & SUPPLY CO.
217 East Second St., Cincinnati, Ohio

50" x 28' NORTON ROLL GRINDER, M. D.

Immediate Delivery



AARON MACHINERY CO.
45 CROSBY STREET **NEW YORK, N. Y.**
CAnal 6-0421-2

No. 00G B & S Automatics
Carlton 4' Radial Drill, motor on arm.
Bullard 42" Vertical Turret Lathe, spiral drive, arranged for M.D.

D. E. DONY MACHINERY CO.
47 Laureiton Road, Rochester 9, N. Y.

IF YOU ARE DOING DEFENSE WORK

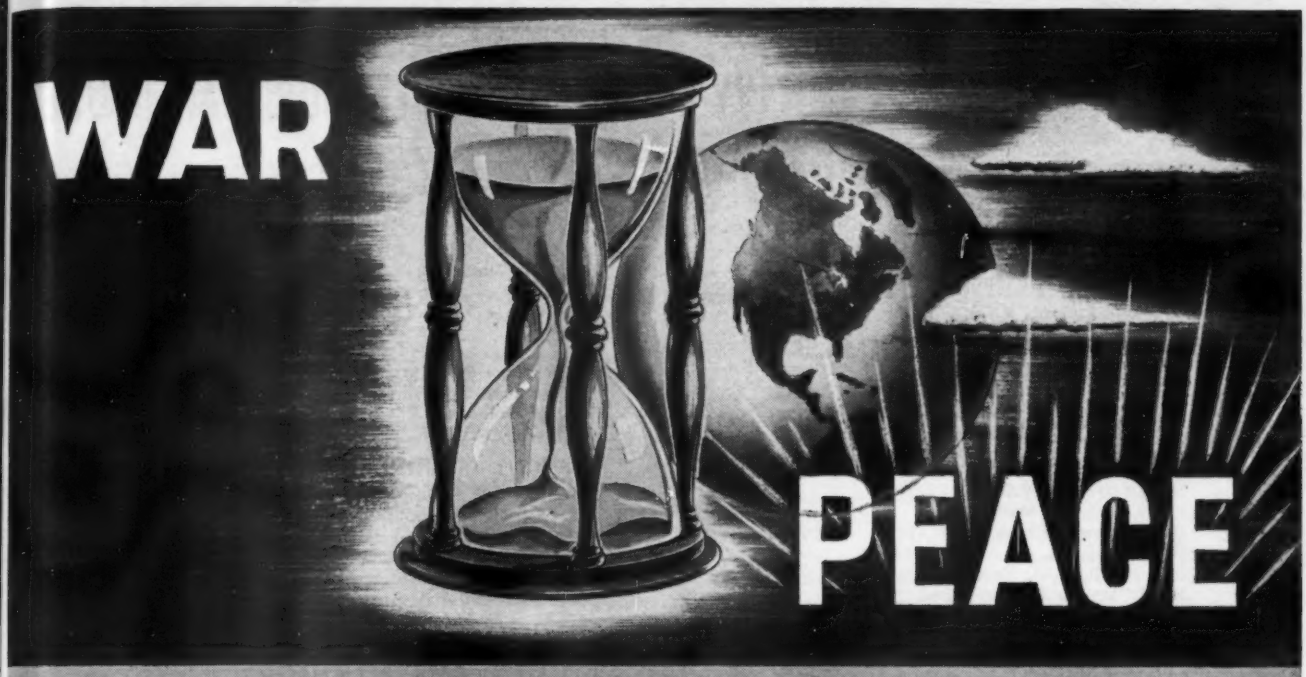
Send for Our Latest Circular Covering Bargains in Small Tools Such as Drills, Reamers, Turret Attachments, etc.

DEWITT TOOL COMPANY
173 Grand St. **New York City**

4' Universal Radial Drill, B.D.
26"x14' Bridgeford Geared Head Lathe.
#14 Cochrane-Bly Vert. Miller & Shaper, M. D.
#2—12"x83" Landis Universal Grinder.
24" Gisholt Turret Lathe, 6¼".
20"-24"-32" Shapers.
10' Bridgeport Knife Grinder.
36" Morton Draw Cut Shaper.
#2 Mitts & Merrill Keyseater, 12"x1¼".

WEST PENN MACHINERY COMPANY
1210 HOUSE BUILDING PITTSBURGH 22, PA.

POWER PRESSES
BLISS, TOLEDO, V & O, ETC.
REBUILT — GUARANTEED
JOSEPH HYMAN & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.



O'BRIEN REBUILDING SAVES WAR TIME AND PEACE TIME

INDUSTRY must *always* save time. Fortunately the O'Brien method of *rebuilding* used machinery saves many hours of original machine life, adds many hours of *new* life. This means good-as-new machinery at a moderate cost. In wartime this is important because it cuts hours, weeks and even months from machine delivery promises. In peacetime, it means man-hours and materials recouped and put to use, resulting in lowered machinery costs. Remember, now and after the war, O'Brien rebuilt means time saved. Remember, too, O'Brien rebuilt machines are OK in every way *and guaranteed.*

IN STOCK—HIGH GRADE MACHINE TOOLS

BORING MILLS—42" PUTNAM, vertical, 2 heads, Q.C. feeds, power rapid traverse, 44" swing, threading attach., M.D.
4½" NILES-BEMENT-POND, horizontal, table type, 33"x60" table, duplex controls, M.D.

RADIAL DRILLS—7' DRESES, "HIGH DUTY," 17" diameter column, universal, tap. attach,. gear box M.D.
5' NILES, 13" dia. col., semi-univ., univ. table, belt or M.D.
4' BICKFORD, 11" dia. col., tap. attach., gear box M.D.

GEAR CUTTER—#4 BROWN & SHARP, 36"x10" cap., S.P., like new.

GRINDERS—#2 BROWN & SHARP, universal, 12"x30" cap., pump, Excello intern. attach.
#309 BESLY, 30" horizontal disc, 15 H.P. motor drive.
#2 LA SALLE, surface, 6"x18" cap., mag. chuck.
#1 WILMARTH & MORMON, surface, cap. 6"x14", mag. chuck, B.B.
#65 HEALD, internal, self-contained, with work holder.

MILLING MACHINES—#2 ROCKFORD, plain, heavy, table 50"x10" w. s., Q.C., M.D.
#1½ BROWN & SHARP, universal, Q.C. feeds, divid. heads, motorized.

PLANERS—36"x36"x10' GRAY "EXTRA HEAVY", 3 heads, excellent.
30"x30"x8' GRAY, 2 heads, motor drive, "SPIRAL-GEARED"

GEARED HEAD LEATHES—20"x22' REED-PRENTICE, All geared head, Q.C., 22½" swing, 17' centers, taper attach., chuck, M.D., cab, legs.
20"x12' LODGE & SHIPLEY, 12 speed "Selective" geared head, taper attach., M.D.
20"x10' LODGE & SHIPLEY, 12 speed "Selective" geared head, chuck, M.D.
18"x10' LODGE & SHIPLEY, 12 speed "Selective" geared head, taper attach., M.D.

LATHES—36"x12' DRAPER, heavy, internal grd., p.c., chuck.
32"x12' PITTSBURG, heavy, DBG, Q.C., motorized.
24"10' LODGE & SHIPLEY, Q.C., cone, chuck, belt drive.
18"x10' HAMILTON, blocks to 26", p.c., chuck, motorized.
18"x8' HENDEY, toolroom, Q.C., 3 step cone, tie-bar, taper attachment.
16"x8' LeBLOND, Q.C., 4 step cone, drop lever positive feeds. motorized.
16"x6' PRATT & WHITNEY, 4 step, chip pan, taper attach., chuck.
16"x6' HAMILTON, 4 step, p.c., chuck, motorized.
12"x6' HENDEY, toolroom, tie-bar, Q.C., chip pan, chuck.

MISCELLANEOUS

16" SMITH & MILLS shaper, vise, 4 step cone.
2" LANDIS pipe machine, ½" to 2" cap, gear box M.D.

Everything from a Pulley to a Power House

THE O'BRIEN MACHINERY CO.

PHILADELPHIA'S LARGEST MACHINERY DEALERS AND EXPORTERS

113 NORTH THIRD STREET • PHILADELPHIA 6, PENNA.

WAREHOUSES AND SHOPS—2820 EAST TIOGA STREET . . . 1224 NORTH FRONT STREET . . . 5534 HAVERFORD AVENUE

BELL TELEPHONE: MARKET 4180 CABLE ADDRESS: OBRIEN PHILA

MUST VACATE — U. S. NAVY HAS TAKEN OVER OUR WAREHOUSE

No Reasonable Offer Refused

VERTICAL BORING MILLS

3 — 42" Bullard, 2 hds, M.D.
54", 62", Colburn, 2 hds, M.D.
60", 10' Niles, 2 hds.
2 — 36" Bullard, V.T.L.

HORIZ. BORING MILLS

2½" Universal, Binsee, M.D.
4" Gisholt, Binsee, M.D.
4½" Bement-Niles

GRINDERS

50"x28' Norton, M.D.
12x28", 12x48", Modern, M.D.
16x50" Norton Crank Shaft
20"x72" Landis
14", 18" P. & W. Vert., M.D.
12x52" Landis Self-Contained

LATHES

24"x26' Putnam
30"x20' LeBlond
24"-48"-60"x12'-16' Harrington Sld. Bed
24"-42"x14' McCabe 2 spindle
26"x14' raised to 34" Rahn-Larmon, M.D.
18"x22' Fay-Scott
24"x10', 12' Boye & Emmes, Taper

MILLERS

No. 2, 3, 4, 5 Cincinnati Plain Grd. Hd., H.P., M.D.
No. 3, 4, Cincinnati Vert., H.P., M.D.
No. 2, 3, 4, Cincinnati Universal
Bliss Planer Type Vert.

RADIALS

4' American Tpl. Purpose, M.D.
3' Cincinnati-Bickford, M.D.
5' Dreses-Mueller
4' Mueller, M.D.

TURRET LATHES

26" Libby, 8" hole, M.D.
24" Gisholt, 6¼" hole
21", 28" Gisholt, 3½" hole
W. & S. No. 2, 4, 6, 2A, 3A, M.D.
B. & S. #00, 0, 2G Automatics
Cleveland Model A Automatics, ⅜" — 2½
#6A P. & J., M.D.
18" Libbey

MISCELLANEOUS

6", 10" P. & W. Slotters, M.D.
McCabe ½" Flangers
Pels 6' Throat Punch, 1"x1¼"
72" Gardner Grinder, M.D., 1 yr. old
10' Hanchett Face Grinder

AARON MACHINERY CO.

45 CROSBY STREET — NEW YORK, N. Y.

UNUSUAL VALUES

Belt Cutter 1" capacity, 3 spindle
Brake Robinson 5' toggle
Compressor, 120 Schramm, portable
Drill, new 10" Buffalo bench
Drill, ceiling suspended, unlimited drilling area
Drill Press, 20" three spindle Barnes
Drill, six-spindle Henry & Wright, 12" overhang
Drill, two spindle sensitive, #1 Morse taper
Grinder, #20 Bryant deep hole internal
Grinder, 60" plate
Grinder, Sellers Tool
Hammer, 50# Bradley helve
Lathe, 14"x12' Lodge-Shipley grd. hd. s.c. mir. dr.
Lathe, 24" x 18' Steptoe-McFarlan
Pipe Machine, 6" Merrell
Press #6-7 Zah-Hahnemann straight side grd.
Press, #1 open back inclinable, motor drive.
Punch & Shear, two ½" capacity
Threading Machine, #0 Webster & Perks
Turret Lathe, L & D brass, cross slide turret
Vacuum Cleaners, heavy duty for shop use

THE OSBORNE & SEXTON MACHINERY CO.
COLUMBUS, OHIO

MISCELLANEOUS MACHINES

48"x36"x16' Gray Dbl. Housing Planer, 3 hds., 15 HP, A.C. m.d.
3" bar Morris Horiz. Boring Mill with 4 boring bars, m.d.
3' Carlton Sensi. Radial Drill, #3MT hole
6' Niles Pl. Radial Drill, gear box m.d., 15 HP motor, rebuilt
12"x18" Cinci. Plunge Cut Grinder, m.d. accommodates wheels up to 9" face, rebuilt
Gisholt Tool Grinder, m.d.

STRONG, CARLISLE & HAMMOND CO.
1392 West 3rd St., Cleveland, Ohio — 2832 East Grand Blvd., Detroit, Michigan

BORING MILLS

10', 60" Niles Vert.
3½" Rochester Floor, M.D.
4", 4½" Gisholt and Niles Horiz.
54", 60" Colburn Vert., M.D.
36" Niles, Bausch
36" Bullard V.T.L., M.D.
42" Bullard, M.D.
2½" Binsee, Universal, M.D.
3" Rockford Horiz., M.D.

CANAL MACHINERY COMPANY
176 LAFAYETTE STREET, NEW YORK, N.Y.

COMPRESSORS

300 CFM Chi. Pneu. with 75 H.P. motor
526 CFM Ingersoll-Rand, Style "JC"
599 CFM Ingersoll-Rand Type 10XB horiz. 2-st., 100 lb. W.P., b.d., 150 H.P. 3/60/400 V motor, starter, etc.
940 CFM Ingersoll-Rand Type 10XB horiz. 2-stage, steam driven with receiver.

MOTORS

Write for our complete list, from 5 to 150 H.P.

MISCELLANEOUS

36" Niles Center Driven Lathe for truing R.R. Wheels mounted on axles.
48" Niles Bement Pond Car Wheel Borer, motor drive.

TRACTOR WAGONS

Allis Chalmers Speed-Age
7½-yd. capacity
in excellent condition

Write for illustrated bulletin!

IRON & STEEL PRODUCTS, INC.

13498 S. Brainard Avenue
CHICAGO 33, ILL.

"Anything containing IRON or STEEL."

GEAR MACHINERY

9" Pratt & Whitney Gear Grinder, M.D.
11" Gleason Bevel Gear Generator
No. 64 Fellows — 11½ Hole, M.D.
No. 6 Fellows Gear Shaper
Cimatool gear chamfering, M.D.
Lees-Bradner Gear Grinder

MISCELLANEOUS

Goss & De Leeuw 6" x 6¾" Auto.
4¼" x 12" Pratt & Whitney Thread Millers (2)
6" x 48" Pratt & Whitney Thread Miller
30" x 36" x 8 Woodward & Powell Planer Rev. M.D.
36" — 48" x 12 Cinc. Planer, Rev. M.D. 4 Hds.
21-SA Cochrane-Bly H.S. Saw
No. 171 Bliss Stiles Sprue Cutter
12" Lamb & Nash Type K Slitter
6" x 30" Jones & Lamson Thread Grinder
No. 3 Cincinnati Vert. Miller
New Delta Drilling Equipment

GRINDERS

#3 Centerloin Cutter & Tool
10" x 120" Norton (Hill-Clarke)
No. 91A Cowl Cutter & Tool

WIGGLESWORTH MACHINERY CO.

203 Bent St., Cambridge, Mass.

GOOD MACHINES

Immediate Shipment!

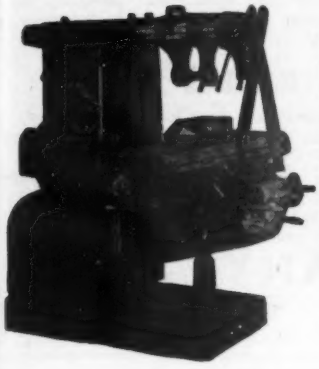
CARLTON 4' Radial Drill; 11" column, motor driven.
MATTISON 14x16x36 Hydraulic Surface Grinder; M.D.
KEARNEY & TRECKER 3K Plain Vertical Mill; motor in base.
UNIVERSAL Boring Bar; 2½", table type, all power feeds, single pulley gear box drive.
BAKER 36" Drill; quick change gear feed, 4' cap., No. 6 Morse taper.
MOLINE No. 5D Hole Hog; 4 spindle, arranged motor drive.
WALCOTT 24" x 22' cone head Lathe; taper attachment, chuck, belt drive.
WARNER & SWASEY #3A Turret Lathe; Universal, motor drive.
WARNER & SWASEY #2A Turret Lathe; arranged for chucking; motor drive.
INGERSOLL 36" x 36" x 10' Fixed Rail Planer Type Milling Machine; with 3 horizontal spindles and 2 vertical spindles; arranged motor drive.
SUNDSTRAND #3 Rigid Mill; M.D.
POND 84" x 72" x 20' Planer; 4 heads with 35 H.P. D.C. reversing motor drive and controls.

Send for Complete Listing

ACME EQUIPMENT CO.
128 So. Clinton St., Chicago, Illinois

QUICK DELIVERY

MILLING MACHINES



PLAIN

No. 2-S K & T Double Overarm; Motor in base
No. 2-B K & T Dble. overarm
No. 3 CINCINNATI, Rapid trav. S.P.D.; Hi-power
No. 5 CINCINNATI, Rect. overarm, 21"x83" table, M.D.
No. 4 CINCINNATI, Rect. overarm; Rapid traverse
No. 4 LeBLOND HEAVY DUTY
Nos. 3 & 2 CINCINNATI
No. 3 Kempsmith

UNIVERSAL

No. 3 CINCINNATI, S.P.D.; No. 3 CINCINNATI; No. 3 B & S No. 1 KEMPSMITH; No. 1½ CINCINNATI

VERTICAL

Nos. 3 & 2 BROWN & SHARPE; No. 5-B BECKER; 2½B KEARNEY & TRECKER

THREAD MILLS

6"x48" & 6"x72" PRATT & WHITNEY; No. 3 LEES BRADNER

FLOOR LATHES

16"x8' AMERICAN GD. HD.
24"x12' LEBLOND
18"x10' HENDEY, T.A., M.D.
14"x6' PRENTICE
42"x18' NEW HAVEN, 10' centers, Triple Geared, M.D.
30' PIT LATHE, Face plate 156"—PIT LATHE, 86" swing
24"x15" NEW HAVEN; 8" SUNDSTRAND
30" NBP DOUBLE AXLE LATHE

SHAPERS

28" ROCKFORD, Gear Box, M.D.
28" OHIO, Heavy Duty (2) 20" CINCINNATI
15" & 24" POTTER JOHNSON, Univ. tables
7" PORTER CABLE

FLOOR DRILLS

No. 263 & No. 242 BARNES, 25" & 26"
36" PRENTICE, 36" SNYDER
36" BAKER, Heavy Duty, No. 6 M.T.
34" BARNES, 20" SYBLEY
20" COLBURN MFG., Gd. Feed

PLANERS

36" SELLERS PLATE PLANER, Pneu. holddowns; Motor Drive
60"x60"x18 FT. WOODWARD POWELL, 4 heads
60"x60"x18 FT. NILES, 2 heads on rail, M.D.
44"x36"x12 FT. GRAY, 2 heads on rail
24"x24"x5 FT. GRAY

TURRET LATHES

3—21" GISHOLTS, 3½" & 5" holes in spindle
9—JONES & LANSON, Gd. Hd., AC motor drive; Sizes—2¼"x24" & 3"x36"
4—No. 6-A POTTER & JOHNSONS
Nos. 4 & 2 WARNER & SWASEY, Wire Feed
No. 3 BARDONS & OLIVER, Wire Feed
28" NILES BEMENT POND, Gd. Hd., 4½" hole in spindle
No. 16 GISHOLT SIMPLIMATICS; 21" & 23" swings, S.P.D.

RADIAL DRILLS

5 FT. & 4 FT. REED PRENTICE, M.D.
4 FT. RYERSON, 11" Column, S.P.D.
4 FT. AMERICAN, No. 5 M.T., 11" col.
3 FT. FOSDICK, No. 4 M.T., 10" col.

GEAR MACHINERY

36" FELLOWS GEAR SHAPER
No. 12 BARBER COLEMAN HOBBER
No. 36BT GOULD & EBERHARDT TURRET TYPE BEVEL ROUGHER

MILLS — PLANER TYPE & SLAB

44"x40"x10' INGERSOLL PLANER TYPE; Adj. rail; 4 heads
42"x12' INGERSOLL PLANER TYPE; 2 side heads, 1 vert. hd.
42"x42"x13' INGERSOLL SLAB; 1 vert. hd., M.D.

HORIZONTAL BORING MILLS

8" NILES BEMENT POND, Floor type, Extra high column, All geared feeds, M.D. with motor
No. 43 LUCAS, 5" BAR; Table Type, 48"x72" table; M.D. (2)
6" GIDDINGS LEWIS, Table Type, New 1942;
5" DETRICK HARVEY, Floor Type; M.D., No. 6 M.T.
3½" No. 32 GIDDINGS LEWIS, M.D.
3⅛" No. 0 GIDDINGS LEWIS, Table type, M.D.
3" LUCAS, Table type, M.D.
2½" CLEVELAND; 3½" BEAMAN SMITH
4" KEMPSMITH, 3" MORRIS
SNYDER & FOOTE BURTE 2-Way DRILLING & BORING MACHINES

VERTICAL BORING MILLS

10 FT. POND, 8' dia. table, 7 chuck jaws, Power feed, M.D. with motor
72" & 60" COLBURNS, Geared feeds, Rapid traverse
53" NBP; 51" BULLARD, 48" COLBURN
42" GISHOLT, Rapid traverse
6" BULLARD MULT-AU-MATIC, 4 stations; M.D., Late type machine

GRINDERS

CENTERLESS

No. 2 CINCINNATI, M.D.
2—PRAC. NEW ZEPHYR MODEL M-1, Grinding wheel and feed wheel, with motors, coolant pump and tank

SURFACE

No. 16A BLANCHARD AUTOMATIC Rotary, 30" Mag. chuck, 18" wheel
No. 16 BLANCHARD, 26" mag. chuck, M.D.
15"x15"x96" NORTON, 2 mag. chucks
No. 3 ABRASIVE, No. 2 WILMARTH NORMAN

CYLINDRICAL

14"x72" NORTON, 2"x16" wheel
No. 22 LANDIS; 6"x18" LANDIS PLAIN
No. 1 LANDIS UNIVERSAL; BATH UNIVERSAL
32"x10'x8" FARREL ROLL GRINDER Will grind rolls up to maximum of 34" diameter and 10' between centers; 30" WHEEL; With AC motors

SCREW MACHINES

2¼" GRIDLEYS—1 spindle (2)
No. 55 NATIONAL ACMES
No. 652 NEW BRITAIN CHUCKER
Nos. 2 & 3 MANVILLE WOOD SCREW MACHINES

INTERSTATE MACHINERY CO., INC.
1439 W. PERSHING RD. TEL. YARDS 5800 CHICAGO, 9, ILL.

UNUSUAL OFFERINGS • *Immediate Delivery*

MILLING MACHINES

#1, #2, #3, #4 and #5 Cincinnati, Brown & Sharpe, Milwaukee Horizontal and Vertical, Plain and Universal.

TURRET LATHES

#1, #2, #4 and #8 Warner & Swasey, Bardons & Oliver, Pratt & Whitney and Libby, Bar and Chucking Machines, #5 Gisholt (few months old).

BORING MILLS

42" & 54" Colburn.

AUTOMATICS

⅞", 1¼", 2¼" Gridleys, 4 Spindle, Model G.

2 — 6 Spindle New Britains, M.D. 1⅛" Cap. (One only 3 months old).

GRINDERS

Swanson Mfg. Co. Internal (Almost new) Rivets #103 and other Internal Many Surface and Cylindrical Grinders in stock.

RADIAL DRILLS

3' American, 3' Cincinnati-Bickford, 6' Niles.

Large Stock of Shapers, Lathes, Drill Presses. This Is a Partial List. Send Us Your Inquiries.

We Buy, Sell, Liquidate, Appraise and Exchange Single Tools or Entire Plants

S & S MACHINERY COMPANY

207 CENTRE STREET **Telephone: WOrth 4-5710** **NEW YORK, 13, N. Y.**

WANTED

Continued from page 317

ADDITIONAL LINES WANTED for Cincinnati territory by sales agency experienced in machinery, machine tools and gages, and manufacturing methods. We also can display items in our sales room and store for specialty for office, factory and home. Blackketter Equipment Co., 3900 Reading Road, Cincinnati, Ohio.

PATENT ATTORNEY

PATENTS, COPYRIGHTS, Booklet, "General Information Concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915, Lancaster, Allwine & Rommel, Suite 453, 815-15th St., N. W., Washington, D. C.

SPECIAL SERVICE

MEXICO: EXPORT MANAGER visiting Mexico in March will execute special commission or make investigations. SS-753, American Machinist, 330 W. 42nd St., New York 18, N. Y.

CONTRACT WORK

WORK WANTED—For advertisement of work wanted see pages 316 and 317.

WANTED

ANYTHING within reason that is wanted in the field served by American Machinist can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

WANTED

New York and Export Agency

For Line of High Grade Machine Tools
Also Some Small Tools

H. W. COTTON

475 FIFTH AVE., NEW YORK 17, N. Y.

NEW INVENTIONS WANTED

Mechanical and electrical devices for post-war manufacture and sale. Either new ideas, or improvements upon present methods.

P. O. Box 217, Denville, N. J.

NEW INVENTIONS WANTED

Seeking small or medium size devices, preferably items for post-war consumer trade. Patents purchased outright or on royalty basis.

CLARK MACHINE CO.
Brant Avenue, Clark (Rahway) N. J.

OTT MACHINERY SPECIALS

AUTOMATICS, Acme, Model C—9/16" M.D.
AUTOMATICS, Gridley, 9/16" & ⅞" Model G, M.D.
AUTOMATICS, Gridley, 2¼, 4¼ & 5¼" S.S.
AUTOMATICS, Cleveland, 1¼, 1½, 2, 2¾ & 3¾" M.D.
AUTOMATICS, Cleveland, ⅞, 1¼ & 2½" Mod. B
AUTOMATICS, Cleveland, 1¼ & 1½" Model M
AUTOMATICS, New Britain #22 M.D.
AUTOMATICS, Potter & Johnston #5A & 6A
GEAR HOBBERS, #5A Lees Bradner, M.D.
GEAR SHAPERS, #7 High Speed, M.D.
GRINDER, Blanchard #16 A.R. 5, 30" x 18" Magnetic Chuck, M.D.
LATHE, Steinle Turret, 24 x 4½ & 6¼@ M.D.
LATHES, Warner & Swasey #2A & 3A, M.D.
MILLING MACHINES, Becker Vertical, Model S. D. 40" Rotary Table
MILLING MACHINE, Milwaukee, #3 B Plain, M.D.
PRESSES, O. B. I. Horning & Co.

OTT MACHINERY SALES, INC.
542 Second Ave. **Detroit 26, Mich.**

ST. LOUIS' Headquarters For Good Used Tools, Offers:

ROCKFORD 24" S.P.D. Shaper
BAUSH 44" M.D. Vert. Boring Mill
MUELLER 4½" Gear Box Drive Radial Drill
CIN. 36" x 36" x 10' 2-H.D.S. Planer
NATCO 4-SP. Hyd. Horiz. Drill
GISHOLT 30" Vert. Turret Lathe
CIN. 48" Pl. Auto. Miller M.D.
NILES 12" Vert. Slotter
INGERSOLL 2-Sp. Vert. Miller
G & E 72" Auto. Gear Cutter
DIAMOND M. D. Horiz. Surf. Grinder
GOULD & EBERHART Rotary Milling Mach.
BIGNALL-KEELER 12" M.D. Pipe Machine
MADISON-KIPP Die Casting Mach.
SMALLEY GENERAL #25-A Thread Miller
BRADFORD 22" x 18' Grd. H.D. Lathe
Write Us For Any Other Tools You May Want. Let Us Quote On All Machinery Needs

McDONALD MACHINERY CO.
1531-35 N. Broadway St. Louis, Mo.

SCREW MACHINES

NEW BRITAIN ⅝", 1" 1⅝" six spindle auto. M.D.
BROWNE & SHARPE #0, #2, auto. M.D.
CLEVELAND ¾" cap. single spindle.
BLISS & ADRIANCE single and double action pressure.

National Machinery Exchange
"If It's Machinery—We Have It"
134-138 Mott St., NEW YORK, N. Y.

FOR SALE

Pratt & Whitney 14" x 36" Vertical Spindle Ball Bearing Grinder, Model B, Serial #945, motor drive including motor and 11" x 34" magnetic chuck. Excellent condition.

OGDEN R. ADAMS
284-286 State Street Rochester, N. Y.
Tels. Main 6374-5

FOR SALE
PANGBORN SAND BLAST

Type 2 GH—5 cu. foot barrel capacity. Direct pressure blast application. Complete unit with blast machine and abrasive separator. Arranged for motor drive. This unit is in perfect condition. Price cheap.

GLOBE TRADING COMPANY
920 W. Lafayette Blvd.
Detroit, Mich. Cad. 6198

SHEET METAL MACHINERY

NEW and USED—Hand and Power Brakes, Shears, Forming Rolls, Folders, Punches, Rotary Machines, Stakes, Spot and Arc Welders.

B. D. BROOKS, INC.
361 Atlantic Ave., Boston, Mass.

MANUFACTURER WANTED

Manufacturer of medium sized machinery desires to discontinue actual manufacturing. We will turn over jigs, fixtures, patterns, etc., and entire inventory of parts at cost to contractor, who will immediately receive an order for complete machines.

Business will be continuous. This is not a war baby. Our volume will increase tremendously with the coming of peace.

Box 765, AMERICAN MACHINIST
330 West 42nd Street **New York 18, N. Y.**

EASTERN OFFERS FROM STOCK

RADIAL DRILLS
2' American Triple Geared, m.d.
2½' Carlton Sensitive, gear box
3' American Triple Purpose, m.d. on arm, late type
3' American Hole Wizard, m.d. on arm, 18 speeds, late type
3' American Sensitive, cone
3' Carlton Sensitive, cone
3' Cincinnati Bickford Plain, gear box on base
3' Fosdick Sensitive, gear box
3' Western Plain, gear box
3½' Cincinnati-Bickford Plain, U.S. Vari-Drive
3½' Cincinnati-Bickford Plain, var. speed d.c. motor
4' American Triple Purpose, 13" column, m.d. on base, late type
4' Cincinnati-Bickford Plain, m.d. on base
4' Cincinnati-Bickford Super-Service, m.d. on arm, 13" column, late type
4' Hammond Jack-Knife
4' Niles-Bement-Pond Semi-Universal, U.S. Vari-Drive on base
5' American Triple Geared, gear box on base
5' Cincinnati-Bickford Super-Service, 17" column, m.d. on arm, late type
5' Niles-Bement-Pond Full Universal, m.d. on base, universal table
5' Prentice Plain, U. S. Vari-Drive
6' Niles-Bement-Pond Semi-Universal, U. S. Vari-Drive
7' American Triple Purpose, m.d. on arm, 16" column

GEAR MACHINERY
No. 712 Fellows H.S. Gear Shaper, m.d.
No. 41, 615 Fellows Gear Shapers, m.d.
Cross Gear Tooth Rounder, m.d.
No. 2-26" Cincinnati Gear Cutter
No. 3-26" Brown & Sharpe
No. 3-36" Brown & Sharpe
No. 3 Heavy Brown & Sharpe
No. 4-36" Brown & Sharpe
No. 4-48" Brown & Sharpe
No. 6-60" Brown & Sharpe
No. 6-72" Brown & Sharpe
Gleason Spiral Bevel Gear Rougher
12" Ingle Gear Tooth Rounder
16" Gould & Eberhardt
18" Gleason Straight Tooth Bevel
30" Brainerd Spur & Bevel
48" Cleveland Hobber

VALVE SEAT GRINDER
Cincinnati Valve Seat Grinder, m.d., with motors, has diaphragm chuck, cap. ⅝" valve stems

BROACHING MACHINES
NBW Cincinnati Mill Breach, circular type, 10" spindle dia., m.d.
No. 2 LaPointe of Hudson, belt
No. 2 J. N. LaPointe Double

BALL BEARING DRILLS
Providence Eng. Co. Model E, 7" overhang
No. 5M — 16" Fosdick, motor on spindle
Automatic Sens., m.d.
Taylor & Fenn, 6½" overhang
Henry & Wright Class K, 7" overhang
2 spindle Sigourney, 7½" overhang
3 spindle Barr, 7" overhang
4 spindle No. 2 Fosdick, p.f., 8" overhang
4 spindle Gardam, 7" overhang
4 spindle Kokomo, 13" overhang
6 spindle No. 3 Avey, 13" overhang

MULTIPLE SPINDLE DRILLS
No. 620H Natco Hydraulic, 16 spindles, No. 4 Taper, m.d., late
No. 2 Baush Hydraulic, 12 spindles, No. 2 Taper, m.d.
No. 2 Baush, mechanical, 8 spindles, m.d.
No. 2 Baush, m.d., tapper, 12 spindles
No. 3 Baush, m.d., 15 spindles
No. 11 Pratt & Whitney, 10 spindles
No. 22AC Fox, 16" round head, 6 spindles
No. 26C Fox Tapper, 36 spindles
8 spindle 12" Rockford Gang, m.d.
4 spindle Harrington H.D., No. 4 taper

HORIZONTAL DRILLS
No. 008 Garvin Horizontal Duplex
Love Bros., No. 4 Taper
Pratt & Whitney Rifling Machine
3 spindle Detroit Semi-Automatic
6 spindle National Acme Horizontal
8 spindle Hammond, hydraulic feed

UPRIGHT DRILLS
20" Cincinnati, m.d.
22" Aurora
24" Cincinnati-Bickford, m.d., tapping
22" Barnes All Geared Self-Oiling
24" Hoefer
24" Sibley, compound table
25" Superior
36" Prentice

Immediate shipment — no priorities required.

The EASTERN MACHINERY CO.
1004 TENNESSEE AVE.
CINCINNATI, OHIO

. . . IN STOCK

AUTOMATICS
No. 00G Brown & Sharpe, single spindle
No. 00 Brown & Sharpe, single spindle
⅞" Model M Cleveland, four spindle
⅞" Model G Gridley, four spindle
4½" Cleveland Model A, single spindle
5½" Cleveland Model A, single spindle

BORING MILLS
148" Betts Vertical, 2 heads
84" Gisholt Vertical, 2 heads
4" Fosdick Horizontal, Floor Type

BROACHES
HO American Hydraulic, Horizontal
XB 10 Allgear Hydraulic, Horizontal

DRILLS
3' Canedy-Otto Radial, Motor spindle
4' American Radial, s.p.d.
24" Colburn, single spindle
Barnes Camelback, single spindle, tapping
No. 17 Foote-Burt, 2 spindle
Avey Sensitive, 3 spindle
Leland-Gifford, Sensitive, P.F., 3 spindle
Barnes Camelback, 4 spindle, 2 tapping
No. 11 Natco, multiple spindle

GEAR CUTTERS
No. 12 Barber Colman
No. 7 Fellows Gear Shaper
30" x 10" Maag Gear Shaper
No. 3 Brown & Sharpe Automatic
96" Gleason Gear Planer
15" Gleason Spiral Bevel Generator
No. 10 Lees-Bradner Gear Grinder
30" Rochester Gear Tooth Rounder

GRINDERS
No. 2 Cincinnati Centerless
No. 16 Blanchard, 26" chuck

LATHES
14" x 8' Monarch, c.d.
18" x 15' Schumaker, Boye & Emmes, c.d.
8" x 60" Fitchburg Lo-Swing, q.h.
20" x 12' Lodge & Davis, c.d.

TURRET LATHES
24" Bullard New Era Vertical, m.d.
36" Bullard New Era Vertical, m.d.
42" Bullard New Era Vertical, m.d.
12" Bullard Mult-Au-Matic, six spindle, m.d.
2A Warner & Swasey, q.h.
3A Warner & Swasey, q.h.
No. 4 Warner & Swasey Universal, c.d.
No. 6 Brown & Sharpe, c.d.
18" Libby Universal, q.h.
26" Libby Universal, q.h., 7½" hole

MILLS
No. 13B Brown & Sharpe, q.h.
No. 12 Brown & Sharpe, c.d.
Briggs Type A, c.d.
No. 3 Kempsmith Vertical Maximiller, m.d.
No. 3 Brown & Sharpe Vertical, s.p.d.
Model C Becker Vertical, s.p.d.
4" Pratt & Whitney Spline

MISCELLANEOUS
16" Betts Slotter
100 Lb. Bradley Helve Hammer
Pratt & Whitney Design Profiler
No. P2 Ferracute Press
13" x 13" Peerless Universal Saw

PLANERS
24" x 24" x 8' American, m.d.
38" x 38" x 12' Niles, m.d.
48" x 48" x 12' Cincinnati, m.d.
72" x 56" x 20' Cincinnati Hypro, m.d.
96" x 96" x 25' Detrick & Harvey Openside, m.d.

Write, Wire or Phone Us

INDIANAPOLIS MACHINERY & SUPPLY CO., INC.
1959-69 South Meridian Street
INDIANAPOLIS, INDIANA
Eastern Branch:
44 WHITEHALL STREET, NEW YORK, N. Y.

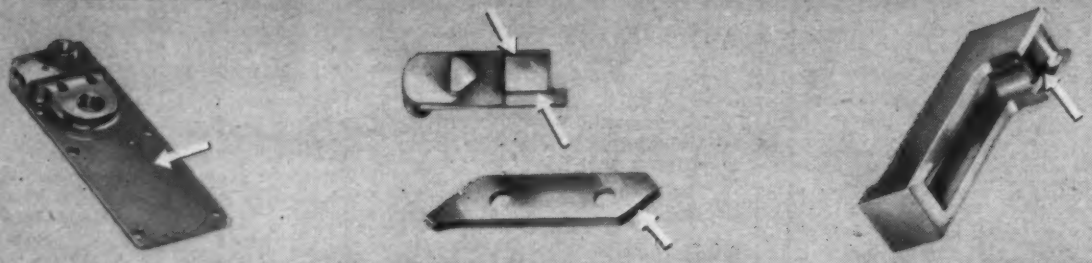
MOREY
Dependable Used Machines

N.B.P. 96"x98"x16' Planer; 4 heads; DC variable M.D.; box table
N.B.P. 48"x36"x14' Planer; 3 heads; box table; belt drive
GRAY 24"x24"x6' Single Head Planer
GRAY 72"x48"x12' Planer — two heads; belt drive
HAMILTON 42"x42"x20' Planer; 3 heads; DC motor drive
LUCAS #3, 3½" bar Horiz. Boring Mill — Belted M.D.
D.&H. 5" bar Horiz. Boring Mill — Floor Type
D.&H. 3½" Bar Horiz. Boring Mill
N.B.P. 38-44" Vert. Boring Mill; side head
TAYLOR & FENN 6" Spline Miller; M.D.
CINCINNATI #3 Vert. Miller; Timken bearing
K.&T. #2B, #3B Plain Millers
CINCINNATI BICKFORD 4' & 6' Plain Radial Drills; M.D.
AMERICAN 3' Radial Drill — motor on arm
NATCO C-13 Hyd. Multiple Drill
NORTON 12x72" Plain Grinder
LANDIS 10x36" Plain Grinder
NORTON 15"x15"x72" Openside Surface Grinder
LANDIS 20"x220" Plain Grinder;
LANDIS #3½ Int. Hydraulic Race Grinder
DIAMOND #4 Surface Grinder; Hyd. Feeds
HEALD #60 Internal Grinder; M.D.
GLEASON 6"-18" Bevel Gear Generators
BROWN & SHARPE #3H Gear Cutter
HENDEY 18"x8' Engine Lathe
ESPEN LUCAS No. 138 Cold Saw — Cap. 12"
SAUNDERS 8"-18" Pipe Threader
TREADWELL 12" Pipe Machine
GISHOLT Precision Balancer
LONG & ALLSTATTER Double Angle Shears
POTTER & JOHNSTON No. 8c Semi-Automatic
100 Ton Horiz. Hydraulic Forcing Press
CINCINNATI Gear Burnisher; M.D.
GOULD & EBERHARDT 24" Shaper —motor drive
LYND FARQUHAR 26" Planer Type Shaper

THIS IS A PARTIAL LIST
Send us your specific inquiries

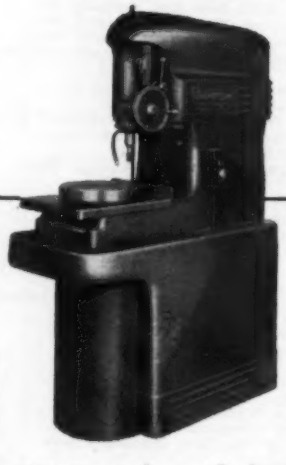
MOREY MACHINERY CO., Inc.
410 BROOME ST., NEW YORK

ON PLAIN MILLING OPERATIONS LIKE THESE



SAVE TIME AND MONEY AND MANPOWER

BY USING THE THOMPSON AUTOMATIC PROFILE MILLER



A number of large manufacturers of precision parts are now making substantial savings on a wide variety of plain milling operations by using Thompson Automatic Profile Millers. These are operations that can utilize the advantages of multiple stations, continuous work table movement, elimination of loading time . . . and other features of this versatile and unusual production machine.

Continuous movement of the work table presents a station to the operator for unloading and reloading at regular intervals and thus "paces" the work . . . production rate is determined by the speed of the machine cycle rather than by the inclination of the operator. The complete elimination of loading time and the use of automatic rapid traverse between stations assure that the cutter is working the maximum amount of time. Because the path of the cutter can be irregular and varied instead of only a straight line, the Thompson Automatic Profile Miller eliminates operations on some plain milling jobs that would otherwise require additional equipment, loading and handling.

Write for a copy of new Bulletin 44-A; it describes the many advantages of the Thompson Automatic Profile Miller.

EARL A. THOMPSON MANUFACTURING COMPANY
1300 HILTON ROAD • FERNDALE, MICHIGAN

ADVERTISERS INDEX

Abbott Ball Company 178
Abrasive Machine Tool Co. 205
Acheson Colloids Corp. 291
Adams Company 182, 216
Aircraft Machinery Co. 242
Air Reduction 307
Allegheny Ludlum Steel Corp. 239
Allis-Chalmers Mfg. Company 69, 76
Almond Mfg. Co., T. R. 306
Aluminum Co. of America 73
American Chain & Cable Co., Inc. 309
American Cutter & Engrg. Corp. 272
American Laundry Machinery Co. 300
American Magnesium Corp. 67
American Optical Co. 305
American Swiss File & Tool Co. 282
American Tool Works Co. 16
Ames Co., B. C. 256
Ampco Metal, Inc. 160
Angier Corp. 272
Anker-Holth Mfg. Co. 262
Armstrong-Blum Mfg. Co. 295
Armstrong Bros. Tool Co. 293
Arter Grinding Machine Co. 234
Atlas Press Co. 160
Automatic Machine & Tool Co. 268
Automotive Maintenance Machinery Co. 192
Avey Drilling Machine Co. 227
Axelson Mfg. Co. 225

Bantam Bearings Div., The Torrington Co. 170
Barber-Colman Co. 39
Barnes Drill Co. 197
Baumbach Mfg. Co., E. A. 190
Baush Machine Tool Co. 199
Bay State Abrasive Products Co. 286
Bethlehem Steel Co. 271
Blake Co., Edward 268
Blanchard Machine Co. 68
Bodine Corp. 194
Bradford Machine Tool Co. 222
Braun Gear Co. 184
Breuer Electric Mfg. Co. 284
Bridgeport Machines, Inc. 230
Brown & Sharpe Mfg. Co. 51, 276
Bryant Chucking Grinder Co. 61
Buhr Machine Tool Co. 296
Bullard Co. 71
Butterfield & Co. Div., Union Twist Drill Co. 64

Capewell Mfg. Co. 144
Carbide Tool Co. 243
Card Mfg. Co., S. W. 65
Carlton Machine Tool Co. 33
Carpenter Steel Co. 36, 37, 276
Castle Films, Inc. 265
Century Electric Co. 169
Chaso Tool Co. 272
Chicago Wheel & Mfg. Co. 141
Chisholm-Moore Hoist Corp. 156
Cincinnati Bickford Tool Co. 79
Cincinnati Electrical Tool Co. 296
Cincinnati Gear Co. 184
Cincinnati Gilbert Machine Tool Co. 240
Cincinnati Grinders, Incorporated 10, 11
Cincinnati Lathe & Tool Co. 240
Cincinnati Milling Machine Co. 4, 5
Cincinnati Planer Co. 24
Cincinnati Shaper Co. 82
Circular Tool Co., Inc. 280
Cities Service Oil Co. 159
Clark Controller Co. 163
Cleveland Automatic Machine Co. 231
Cleveland Hobbing Machine Co. 57
Cleveland Pneumatic Tool Co. 279
Cleveland Punch & Shear Works Co. 44
Cleveland Twist-Drill Co., Momax Division 267
Climax Molybdenum Co. 125
Columbus McKinnon Chain Corp. 156
Cone Automatic Machine Co., Inc. 31
Coulter Machine Co., James 216
Crafts Co., Inc., Arthur A. 296
Criterion Machine Works 276
Cross Gear & Machine Co. 52
Cullen-Friestedt Co. 310
Cushman Chuck Co. 248

Danly Machine Specialties, Inc. 190
Darwin & Milner, Inc. 302
Davis Keyseater Co. 240
Dayton Rogers Mfg. Co. 306
De Laval Separator Co. 299
De Sanno & Son, Inc., A. P. 223, 224
Desmond-Stephan Mfg. Co. 266
Detroit Tap & Tool Co. 137
DeVlieg Machine Co. 72
Disston & Sons Co., Inc., Henry 285
Douglas Machinery Co., Inc. 232
Dow Chemical Co. 153

Eastern Machine Screw Corp. 290
East Shore Machine Products Corp. 290
Elastic Stop Nut Corp. 167
Erickson Steel Co. 252
Errington Mechanical Laboratory 266
Etna Machine Co. 190
Excello Corp. 26, 27

Federal Bearings Co., Inc. 162
Federal Press Co. 189
Federal Products Corp. 241
Fellows Gear Shaper Co. 8, 9
Fenn Mfg. Co. 139
Fidelity Machine Co. 230
Fitchburg Grinding Machine Corp. 77
Follansbee Steel Corp. 145
Fonda Gage Co. 238
Foote Bros. Gear & Machine Corp. 185
Foote Burt Co. 70
Fosdick Machine Tool Co. 48
Fostoria Pressed Steel Co. 312
Frostrode Products 129

Gallmeyer & Livingston Co. 198
Ganschow Gear Co. 184
Gardner Machine Co. 196
Gates Rubber Co. 171
Gear Grinding Machine Co. 203
Gear Specialties Mfgrs. 182
General Die Stamping Tool Co. 280, 282
General Electric Co. 66, 78
Geometric Tool Co. 283
Giddings & Lewis Machine Tool Co. 46, 47
Gisholt Machine Co. 21, 54
Gleason Works 2
Gorton Machine Co., George 209
Goss & deLeeuw Machine Co. 238
Grant Gear Works 182
Grant Mfg. & Machine Co. 190
Gray Co., G. A. 62
Gray Mills Co. 300
Great Lakes Broach & Gage Co. 187
Greene, Tweed & Co. 270
Greenfield Tap & Die Corp. 273
Gulf Oil Corp. 269

Hall Planetary Co. 220
Hamilton Tool Co. 234
Hanchett Mfg. Co. 204
Hanson Whitney Machine Co. 148
Hardinge Brothers, Inc. 58
Hartford Special Machinery Co. 182, 264
Haskins Co., R. G. 268
Haynes Stellite Div. Unioin Carbide & Carbon Co. 297
Heald Machine Co. ..... 2nd Cover
Hendey Machine Co. 275
Hill Acme Co. 32
Hobart Bothers Co. 308
Hoefer Mfg. Co. 264
Holman Reamer Co. 242
Holtzer-Cabot Electric Co. 172
Hones, Inc., Charles A. 310

Ideal Commutator Dresser Co. 294
International Nickel Co., Inc. 158

J. & S. Tool Co. 268
Jefferson Machine Tool Co. 266
Johnson Bronze Co. 168
Johnson Machine Co., Carlyle 302
Jones & Lamson Machine Co. 6, 7
Jones & Laughlin Steel Corp. 135

Kaufman Mfg. Co., L. J. 222
Kearney & Trecker Products Corp. 20
Kennametal, Inc. 56
King Machine Tool Co. 50
Kingsbury Machine Tool Corp. 43
Knight Machinery Co., W. B. 219

L-W Chuck Co. 201
Lake Shore Tool Works, Division of Carbide Tool Co. 243
Laminated Shim Co., Inc. 142
Landis Machine Co. 14, 15
Landis Tool Co. 18, 19
Lane Wells Co. 294
Leach Machinery Co., H. 234
LeBlond Machine Tool Co., R. K. 3rd Cover
Lehmann Machine Co. 232
Leland Gifford Co. 234
Le Maire Tool & Mfg. Co. 184, 214
Liberty Planers, Inc. 206
Liberty Tool & Gage Works, Inc. 242
Lincoln Park Industries, Inc. 235
Lindberg Enginering Co. 255
Linley Bros. Co. 302
Lodge & Shipley Machine Tool Co. 123
Lovejoy Tool Co., Inc. 215
Lucas Machine Tool Co. 240
Luers, J. Milton 310
Lufkin Rule Co. 143

ADVERTISERS INDEX

Macklin Co. 261
Mahon Co., R. C. 233
Mallory & Co., Inc., P. R. 246
Master Gauge Co. 298
Master Rule Mfg. Co. 260
Mathews Conveyor Co. 140
Matthews & Co., James H. 290
McGraw-Hill Book Co., Inc. 312
McKay Co. 289
Meisel Press Mfg. Co. 184
Merz Engineering Co. 298
Metro Tool & Gage Co. 53
Michigan Tool Co. 133
Mid-West Abrasive Co. 60
Millholland Machinery Co., W. K. 236
Mitts & Merrill 242
Modern Tool Works Co. 210
Moline Tool Co. 220
Monarch Machine Tool Co. 25
Moore Special Tool Co., Inc. 303
Morey Machinery Co., Inc. 236
Motor Tool Mfg. Co. 270
Murchey Machine & Tool Co. 253

National Lock Washer Co. 161
National Machine Tool Co. 288
Newark Gear Cutting Machine Co. 184
New Britain-Gridley Machine Div., New Britain Machine Co. 120
New Departure Div., Genral Motors Corp. 131
Niagara Machine & Tool Works 186
Nicholson & Co., W. H. 284
Nicholson File Co. 152
Norma-Hoffmann Bearings Corp'n. 175
North Bros. Mfg. Co. 144
Norton Co. 22, 23

O. K. Tool Co. 218
Oakite Products, Inc. 287
Ohio Machine Tool Co. 34, 35
Oliver Instrument Co. 229
O'Neil Irwin Mfg. Co. 190
Orange Roller Beaing Co., Inc. 179
Osborn Manufacturing Co. 251
Oster Mfg. Co. 200
Ozalid Products Division, General Aniline & Film Corp. 311

Page Steel & Wire Division, American Chain & Cable Co., Inc. 309
Park Chemical Co. 263
Parker-Kalon Corp. 166
Peerless Machine Co. 191
Perkins Machine & Gear Co. 183
Philadelphia Gear Woks, Inc. 181
Phoenix Gage Co. 294
Pittsburgh Steel Co. 154
Plan-O-Mill Corp. 193
Pope Machinery Corp. 244
Portage Machine Co. 240
Porter-McLeod Machine Tool Co., Inc. 232
Potter & Johnston Machine Co. 59
Pratt & Whitney Div. Niles-Bement-Pond Co. 41
Production Machine Co. 238
Producto Machine Co. 218
Progressive Welder Co. 129

Railway Express Agency—Air Express Division 274
Randall & Stickney 242
Ready Tool Co. 296
Reed-Prentice Corp. 40
Reeves Bros., Inc. 304
Rivett Lathe & Grinder, Inc. 221
Robbins & Myers, Inc. 151
Roberts Rubber Co., Weldon 281
Rockford Machine Tool Co. 211
Ruthman Machinery Co. 178

Schrader's Sons, A. 176
Scherr Co., George 74
Schauer Machine Co. 236
Schrillo Aero Tool Enginering Co. 247
Seneca Falls Machine Co. 208
Severance Tool Industries, Inc. 237
Sheffield Corp. 292
Shore Instrument & Mfg. Co., Inc. 290
Sidney Machine Tool Co. 38
Sier-Bath Gear Co., Inc. 180
Sigourney Tool Co. 302
Simonds Saw & Steel Co. 249
Simonds Worden White Co. 266
Sinclair Refining Co., Inc. 245
Skilsaw, Inc. 165
Smit & Sons, J. K. 178
Smith & Mills Co. 234
Snyder Tool & Engineering Co. 217
Sommerfeld Machine Co. 195
Sossner Co. 284
South Bend Lathe Works 42
Specialties Mfg. Co., Inc. 254
Spencer Thermostat Co. 164
Springfield Machine Tool Co. 28
Square D Co. 155
Stahmer Shoe Co., F. J. 304
Standard Gage Co. Inc. 75
Standard Oil Co. (Indiana) 257, 258
Star Electric Motor Co. 157
Starrett Co., L. S. 118
Stevens, Inc., John B. 310
Stow Mfg. Co. 304
Strand Co., N. A. 298
Stuart Oil Co, D. A. 270
Sturtevant Co., P. A. 306
Sundstrand Machine Tool Co. 213
Sunnen Products Co. 212
Swan-Finch Oil Corp. 301
Syncro Devices Inc. 288

Taft Peirce Mfg. Co. 150
Tannewitz Works 230
Taylor Machine Co. 184
Texas Co. 149
Thomas Steel Co. 156
Thompson Mfg. Co., Earl A. 326
Thompson Grinder Co. 30
Tide Water Associated Oil Co. 146, 147
Timken Roller Bearing Co. ..... 4th Cover
Torrington Co., The, Bantam Bearings Div. 170
Torrington Co. 190
Tubular Micrometer Co. 282
Turco Products, Inc. 274

Union Carbide & Carbon Co. 297
Union Twist Drill Co. 63
United States Products Co. 262
United Welding Co. 278
Universal Boring Machine Co. 236
Universal Engineering Co. 280, 288
Utility Tool & Die Mfrs. 290

V & O Press Co. 190
Van Keuren Co. 45
Van Norman Co. 12, 13
Vascoloy-Ramet Corp. 277
Veeder-Root, Inc. 177
Vincent Steel Process Co. 228
Vinco Corp. 250
Vulcan Tool Corp. 29

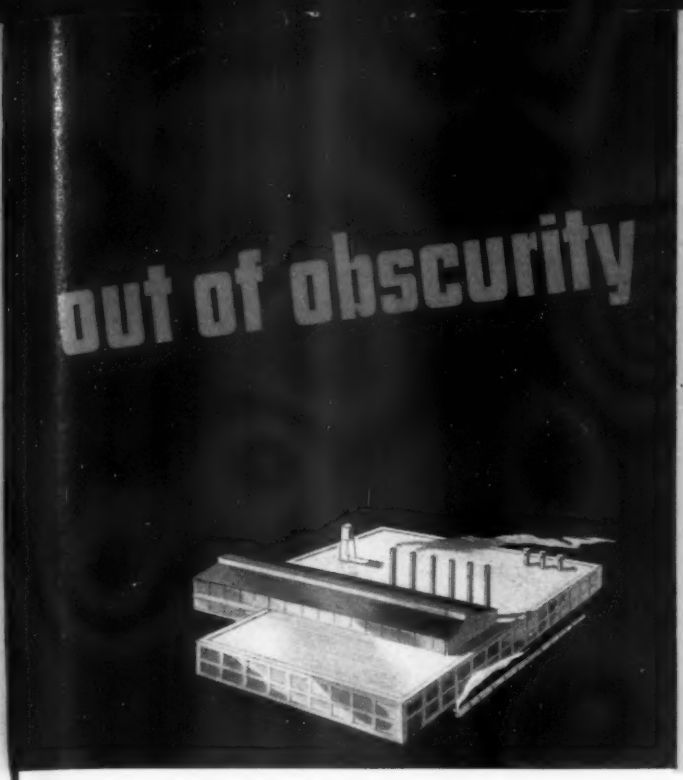
Walker Co., Inc., O. S. 284
Waltham Macine Co. 222
Warner & Swasey Co. 80, 207
Watson-Stillman Co. 202
Webber Gage Co. 127
Weldon Tool Co. 260
Wendt-Sonis Co. 138
Westinghouse Air Brake Co. 17
Westinghouse Electric & Mfg. Co. 49, 55
Williams & Co., J. H. 259
Wilson Mechanical Inst. Co., Inc. 294
Wilson, K. R. 188
Woodworth Co., N. A. 226

Youngstown Welding & Engineering Co. 308

SEARCHLIGHT SECTION

Classified Advertising

Classification	*Page*
BUSINESS OPPORTUNITIES	324
CANTRACT WORK SECTION	316, 317
Acme Eq. Co	322
Adamas Carbine Corpn	316
Bowser, Inc	316
Eastern Tool & Mfg. Co	316
General Pattern Works	317
Greist Mfg. Co.	316
J. & S. Tool Co.	317
King Foundries, Inc	317
Nilson Machine Co., A. H	316
Precision Motors Co	316
Reliance Machine & Mfg. Co	316
Thomas & Skinner Steel Products Co	316
Vandergrift Co	317
PATENT ATTORNEY	324
POSITIONS VACANT	317
POSITIONS WANTD	317
REBUILDING SERVICE	314, 315
Hill-Clarke Machy. Co	315
Simmons Machine Tool Corp	314
SELLING OPPORTUNITIES	317, 324
WANTED TO PURCHASE	317
USED SURPLUS EQUIPMENT	314-325
Adams, Ogden R	324
Aaron Machinery Co	320, 322
Brooks Co., Inc., B. D	324
Canal Machinery Co	322
Cincinnati Machinery & Supply Co	320
DeWitt Tool Co	320
Dony Machinery Co., D. E	320
Eastern Machinery Co	325
Emerman Machinery Corp	320
Falk Machinery Co	319
Globe Trading Co	324
Hill-Clarke Machinery Co	318
Hyman & Son, Joseph	320
Indianapolis Machinery & Supply Co., Inc	325
Interstate Machinery Co., Inc	323
Iron & Steel Products, Inc	322
Manville Machine Co., Inc., E. J	318
McDonald Machinery Co	324
Miles Machinery Co	318
Morey Machinery Co., Inc	325
National Machinery Exchange	324
O'Brien Machinery Co., The	321
Osborne & Sexton Machinery Co	322
Ott Machinery Sales, Inc	324
Paul's Motor & Mchy. Supply	318
S & S Machinery Co	324
Simmons Machine Tool Corp	314
Strong, Carlisle & Hammond Co	322
West Penn Machinery Co	320
Wigglesworth Machinery Co	322
Zeeve & Co., Alex	318



There is a brighter side. From $319 in 1914, net income per capita in these United States climbed to $875 (est) in 1943. Increase in cost of living jumped 76% in the 1913-1918 period of War I. The first five years (1938-1943) of World War II show a climb of 24%. Close of 1944 may well see an accumulated "buying reservoir" of $100,000,000 in American socks. Your plant expanded for war. How about your vision? Has it expanded to include the "peacework" future? To turn a profit, then, calls for turning, now, from production at any cost to production at lowest cost. Look at your lathes, for instance. Then look to LeBlond.

THE R.K. LeBLOND MACHINE TOOL CO., CINCINNATI, 8

NEW YORK 13, 103 Lafayette St. CAnal 6-5281

CHICAGO 6, 20 N. Wacker Dr. STA 5561

time to retool

Turn to Le Blond for Turning Equipment

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

HD Engine Lathes—Nine sizes ranging from 12" to 50" swings. For versatility in turning.

Automatic Lathes—12" & 16" Mechanical or Hydraulic power.

Super Regal Lathes—Six sizes, 13" to 24" Best for training.

Automatic Crankshaft Lathes—For all facing, turning, finishing, pins.

Tool Room Lathes—12", 14", 16" and 18" swings. Versatile.

HD Gap Lathes—Ten sizes in Regular and Sliding Gap models.

Rapid Production Lathes—13", 17", 20" swings. Six speeds. Faster output. Lower cost.

No. 2 Cutter Grinder—Internal, cylindrical, face and angular work.

Check-Clip-Mail

FOR ILLUSTRATED SPECIFICATIONS:

- ☐ HEAVY DUTY GEARED HEAD ENGINE LATHES
- ☐ TOOL ROOM LATHES
- ☐ AUTOMATIC LATHES
- ☐ HEAVY DUTY GEARED HEAD GAP LATHES
- ☐ SUPER REGAL GEARED HEAD LATHES
- ☐ RAPID PRODUCTION LATHES
- ☐ AUTOMATIC CRANKSHAFT LATHES
- ☐ No. 2 CUTTER GRINDER

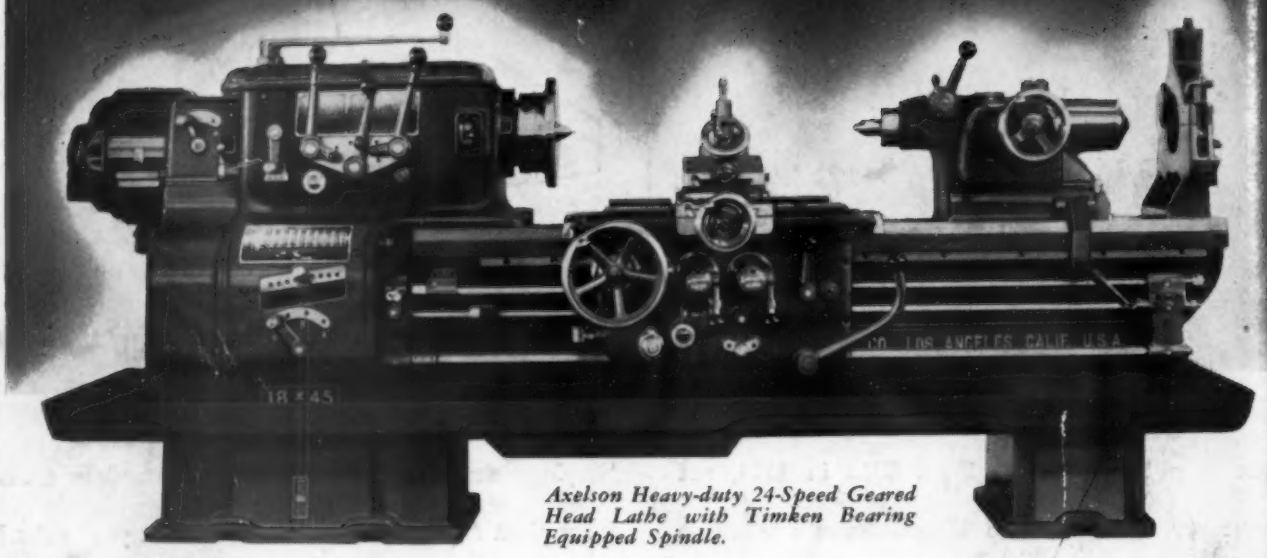
YOUR NAME _____ TITLE _____

YOUR FIRM _____ ADDRESS _____

★ YOUR BONDS BUY BOMBS ★

BUY A "BLOCK-BUSTER" TODAY!

Axelson spells "Precision" with a "T"



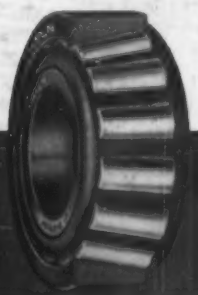
Axelson Heavy-duty 24-Speed Geared Head Lathe with Timken Bearing Equipped Spindle.

And so do most of the other leading manufacturers of machine tools; "T" for "TIMKEN" —meaning Timken Tapered Roller Bearings on machine spindles.

All Axelson Heavy-duty 24-Speed Selective Geared Head Lathes have their spindles mounted on Timken Bearings. These spindles are one-piece alloy steel forgings, stress-relieved, case hardened and ground to extremely close tolerances. Timken Zero Precision Bearings, preloaded, are used at front and rear, providing final assurance of permanent rigidity with freedom from chatter or camming action.

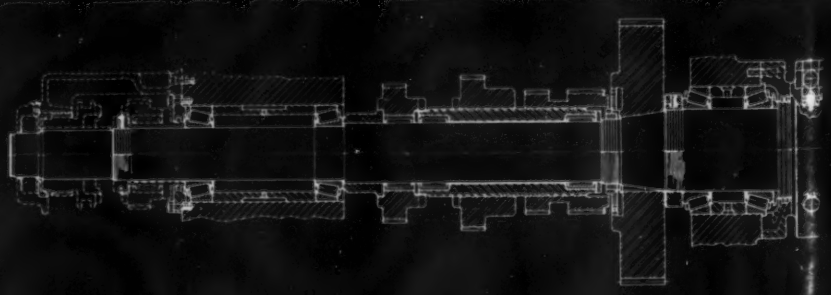
Provision is made for the adjustment of each bearing unit independently, so that any slight wear that may occur after years of service can be quickly and accurately compensated for and the spindle restored to its original precision.

For the future days of reconstruction as well as the urgencies of the present see that you have Timken Bearings in all the new machine tools you manufacture or buy. The Timken Roller Bearing Company, Canton, Ohio.



Application of Timken Bearings on the spindles of Axelson Heavy-duty Geared Head Lathes.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS